

MOSHI CO-OPERATIVE UNIVERSITY

**END USERS' PARTICIPATION ON REVERSE LOGISTICS PERFORMANCE
FOR PLASTIC PACKAGED BEVERAGES IN MOSHI MUNICIPALITY,
TANZANIA**

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FOR PLASTIC PACKAGED BEVERAGES IN MOSHI MUNICIPALITY,
TANZANIA**

**By
SOLANGE NAHIMANA**

**A DISERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENT FOR THE DEGREE OF MASTER OF ARTS IN
PROCUREMENT AND SUPPLY MANAGEMENT OF
MOSHI CO-OPERATIVE UNIVERSITY**

NOVEMBER, 2023

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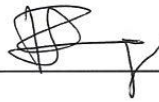
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CERTIFICATION

The undersigned certify that he has read and hereby recommend for acceptance by the Moshi Co-operative University a Dissertation titled “**End Users’ Participation on Reverse Logistics Performance for Plastic Packaged Beverages in Moshi Municipality, Tanzania**” in Partial Fulfilment for the Award of the Degree of Master of Procurement and Supply Management of Moshi Co-operative University.

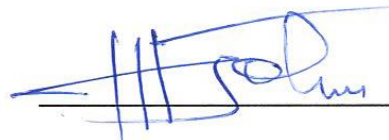
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Date: 01/12/2023

DEDICATION

I dedicate this work to my beloved husband Roger ISHIMWE for his kind support and patience while pursuing my studies. I also dedicate this work to my whole family and friends for their moral support.

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LIST OF ABBREVIATIONS

ATT	:	Attitude
CVI	:	Content Validity Index
EVA	:	Equal Variance Assumed
EVNA	:	Equal Variance Non-Assumed
FBIS	:	Faculty of Business and Information Sciences
GMFI	:	Group Mean of Financial Incentives
IUCEA	:	Inter-University Council of East Africa
KFW	:	Kreditanstalt Fur Wiederaufbau / German investment and development bank
MoCU	:	Moshi Co-operative University
NBS	:	National Bureau of Statistics
PBC	:	Perceived Behavioural Control
PETCO	:	Polyethylene Terephthalate Recycle Company
PLS-SEM	:	Partial Least Square Structural Equation Modelling
PPBs	:	Plastic Packaged Beverages
RL	:	Reverse Logistics
RUT	:	Random Utility Theory
SN	:	Subjective Norms
SPSS	:	Statistical Package for the Social Science
TPB	:	Theory of Planned Behaviour
TSH	:	Tanzania Shillings

ABSTRACT

Effective implementation of Reverse Logistics (RL) in developing countries faces challenges due to limited end user involvement. Manufacturers overlook products after leaving warehouses, leading to a one-way flow between producers and users (forward logistics), causing ecological harm, particularly with Plastic Packaged Beverages (PPBs) wastes. To mitigate this, involving end users in collecting and returning these wastes is crucial. This study investigates how end users' participation affects reverse logistics performance for PPBs in Moshi Municipality, with the specific objectives of determining the factors influencing end users' behavioural intention, investigating the role of financial incentives, and assessing end users' awareness of the reverse logistics performance of PPBs wastes. Using theories of planned behaviour and random utility, a survey was conducted with 400 randomly selected households. The collected data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM), descriptive statistics, and inferential analysis. The findings show that attitudes (ATT) and Perceived Behavioural Control (PBC) significantly impact reverse logistics for PPBs with ATT \rightarrow P is -0.175, P value of $0.004 < 0.05$ and PBC \rightarrow P is -0.098 , P value of $0.000 < 0.05$, respectively. Further, financial incentives play a significant role in accelerating end users' participation. The study also reveals that 92.3% of the respondents are familiar with PPBs wastes, 84.3% Understand the dangers of improper disposal of PPBs wastes and 77% of the respondents Willingness to participate if materials are provided. The study concluded that Attitude and Perceived Behavioural Control have a significant direct effect on the RL of PPBs, financial incentives are among the strongest drivers of participation in RL of PPBs wastes, while non-monetary incentives are also vital, Respondents are familiar with PPBs wastes and dangers associated with improper disposal and are willing to participate if provided with necessary materials. The study recommends collaboration between the government, companies, end users, waste management groups and recycling companies to establish efficient reverse logistics systems for PPBs wastes. This research contributes to the literature by providing insights into end users' perspectives and emphasizes the need for improved reverse logistics practices.

CHAPTER ONE

1.0 INTRODUCTION

This chapter presents the background to the study, problem statement, the general objective of the study, specific objectives, research questions, justification of the study and organization of the study.

1.1 Background of the Study

The Reverse Logistics (RL) practices begin with the end user and usually end with the producer (García-Herrero *et al.*, 2019). It can be more or less complex depending on which practice and intermediate stages are involved. The most known stages are the collection, sorting, transfer, and processing stages. The benefits of practising RL spread across economic, environmental, and social dimensions (Moktadir *et al.*, 2020). Along the process, end users or consumers hold a strong place for the system to function well. Thus, without their active participation, it becomes hard for RL to perform well (Agrawal and Singh, 2019). Therefore, well-organized RL practices not only reduce costs but also increase end users' participation and satisfaction. By promoting end user participation, organizations not only enhance their RL practices but also boost their overall reputation and commitment to sustainability.

Reverse logistics has recently gained significant attention from academics globally as one of the best green initiatives (Veljković *et al.*, 2022). The reasons for such increasing interest in RL include environmental concerns and the desire to maintain sustainability, the need for sustainable waste management, and the desire to engage the end users in proper waste management like returning plastic packages wastes to the collection centres for possible value recovering (Suhandi and Chen, 2022). Additionally, as environmental degradation and pollution keep growing on the global scale, it is the low and middle-income countries that suffer the most from serious health, safety, and environmental consequences (Moshood *et al.*, 2021). According to a World Bank report for developing countries, 90% of plastic waste is often disposed of in unregulated dumps or openly burned. Therefore, integrating a strategy that can add value back into the chain by recovering and repurposing those wastes is crucial to engaging in reverse logistics practices (World Bank, 2020).

Various studies indicate that behaviour change, and end users' active participation have a great impact on the performance of reverse logistics (Moshood *et al.*, 2021). While some measure the performance of reverse logistics based on profitability, others go further to include the level of end users' participation, engagement, recycled and donated products, number of preferences, improved efficiency and cost reduction (Awasthi *et al.*, 2021). Environmentalists advocate for the banning of plastic materials considering their harmfulness when unreasonably released into the environment. However, on the other side of the coin, such materials are not fundamentally bad as they possess several redeeming ecological features (Lin *et al.*, 2022). For instance, plastic packages are durable and easy to transport which saves both production and transport energy. Once discarded, they generate plastic waste which pollutes the environment. Over the last decade, plastic packaged beverages (PPBs) waste has increased, and the trend is expected to continue if proper measures are not taken (Liu and Wang, 2019). To slow down the trend, beverage manufacturing companies like Coca-Cola and Pepsi have put efforts into raising end users' participation to minimize plastic bottles deposited in the environment using strategies such as providing incentives to people upon returning empty bottles to collection stations and working with third-party companies to collect and recycle them (Akindede and Alimba, 2021). Such measures, however, prevail in developed countries, unlike in the developing world.

In Tanzania, about 315 thousand tons of plastic were produced in 2022, of which only 40% was collected, and 4% recycled, leaving the remaining unhandled and could potentially leak into the ocean, roadside canals, lakes and over 50% of plastic waste are PPBs (Olatunji, 2022; Nipe Fagio Report, 2020). Thus, these signal poor waste management in general and particularly could mean a weak performance of reverse logistics practices in beverage companies and low involvement of end users in that process. Despite such poor waste management, some initiatives to minimize plastic package waste have started to spring up. For example, eight beverage (One Product & Bottles (MeTT), Coca Cola Kwanza, SBC Tanzania (Pepsi), Nyana Bottling, Bonite Bottlers, Sayona Drink, Cool Blue Pure Drinking Water and Silafrica) companies formulated a partnership to form the Polyethylene Terephthalate Recycle Company (PETCO) to reduce plastic waste. Although this is by far a great initiative, it does not clearly show how end users will be involved. In addition, the proposed areas of

operation (Kinondoni, Ilala, Temeke, Ubongo and Kigamboni) are all located in the port city of Dar-Es-Salam, leaving out mid-size cities like Moshi.

Moreover, engaging end users is a big part of any project that aims to reduce plastic packaged beverage waste and integrate them back into the supply chain. However, it requires various measures and strategies to stimulate that spirit of involvement. For instance, Rebehy *et al.* (2019) found a strong positive relationship between financial incentive application and behavioural changes which increases the likelihood of a compelling reverse logistics performance. Furthermore, Abila and Kantola (2019) expressed that when the necessary requirements for an effective reverse logistics process are satisfied, there is a chance that the number of end users committed to returning plastic waste to the collection point at the household level will increase.

Financial incentive strategies have been employed in countries like Italy, the USA, China, Finland, and Hong Kong, and yielded positive results (Aslam *et al.*, 2020; Zhou, *et al.*, 2021; Abila and Kantola, 2019; Aprile and Fiorillo, 2019; Mak *et al.*, 2018). However, such initiatives are scarce in developing countries which could justify the low number of participants in RL of plastic packaged beverages (Reynolds *et al.*, 2019). In this study, the researcher then investigated how end users perceived such initiatives to increase their participation in the RL performance of plastic packaged beverage wastes. Additionally, as end users stand at the centre of RL of plastic packaged beverages, understanding their behavioural intentions could help policymakers and businesses find better ways of engaging them to improve the reverse logistics performance efficiently (Shih *et al.*, 2021). Hence, this study aims at shading light to that matter.

Existing studies on RL performance such as Khan *et al.* (2019) in Pakistan and Sari *et al.* (2021) in Indonesia revealed that pressure from friends; willingness; family and personal attitudes influence consumers' participation in RL practices. Amole *et al.* (2018) reported that manufacturers are aware of reverse logistics practices and acknowledge RL to be significant in achieving organisational goals. However, Fikru (2020) found that management and employees do not understand about the concept of RL practices and their importance to them. Abila and Kantola (2019) conducted a study on the contribution of incentives in reverse logistics practices in Finland and found that financial incentives are positively significant. However, conflicting results in existing

literature necessitate further investigation, particularly in the context of end user participation's impact on reverse logistics performance. Therefore, it is relevant to fill the knowledge gap in the existing literature by examining end users' behavioural intentions factors, the role of financial incentives and awareness of the reverse logistics performance of plastic packaged beverages in Moshi Municipality, Tanzania.

1.2 Statement of the Problem

In reverse logistics, end users hold a powerful position in overall performance (Tien *et al.*, 2019). In the same way, for reverse logistics as the flow of goods from the market to the production sites to be effective, solid end users' participation is needed (Agrawal and Singh, 2019; Awasthi *et al.*, 2021; Sazvar *et al.*, 2022). However, governments and manufacturers in the developing world have failed to promote and fortify such involvement. In Africa, RL is still in its infancy stage as manufacturers pay little or no attention to their products after they have left warehouses, and the connection between producers and end users flows in one-way(forward logistics) (Mathiyazhagan *et al.*, 2021).

In Tanzania, a waste audit reported that of all wastes generated in 2020, 60% were plastics and PPBs alone contained almost half of all plastic wastes generated (Nipe Fagio Report, 2020). over 300 thousand tons of plastic waste (including PPBs) were generated in 2022, where 40% of it was collected, and only 4% recycled, while over 29 thousand tons leaked into various water bodies (Olatunji, 2022). This shows a weak performance of RL. The government and private companies have enacted various policies and initiatives to address the issue. Examples include the 2007 National Health Policy and 2009 Management Act which indicate that it is the responsibility of businesses, consumers, and local government to minimize plastic waste. Additionally, one of the early attempts by producers include the Polyethylene Terephthalate Recycle Company (PETCO) project, an initiative of eight beverage manufacturing companies to recycle some of the used plastics, however, the implementation remains questionable as the project does not indicate how the end users' participation will be sustained.

Consumers' participation and RL performance have been a major topic among various scholars Abdissa *et al.* (2021); Sari *et al.* (2021); Fikru (2020); Khan *et al.* (2019); Abila (2019); Amole *et al.* (2018). However, some of the above evaluated studies found mixed results Fikru (2020); and Amole *et al.* (2018), where the latter found a positive

understanding and awareness of RL practices, while the former revealed a negative insignificance. Other studies indicated factors leads to poor performance in RL such as lack of incentives, peoples' attitude, and behaviour. However, none of the evaluated studies clearly show the link between end users' participation and the performance of RL of PPBs wastes. Therefore, this study intended to assess how end users' participation impacts the performance of reverse logistics of plastic packaged beverages. The study focused on assessing the behavioural intentions factors, the role of financial incentives and the knowledge of end users on RL practices (awareness) to engage in reverse logistics performance of PPBs wastes.

1.3 Research Objectives

The study has a general and specific objective.

1.3.1 Main Objective

The main objective is to assess end users' participation in the reverse logistics performance of plastic packaged beverages.

1.3.2 Specific Objectives

- i. To determine factors influencing end users' behavioural intention to participate in reverse logistics of plastic packaged beverages.
- ii. To investigate the role of financial incentives on end users' participation in the reverse logistics of plastic packaged beverages.
- iii. To assess the level of end users' awareness of the reverse logistics performance of plastic packaged beverages.

1.4 Research Questions

The study has the following research questions:

- i. What are the factors that influence end users' behavioural intention to participate in the reverse logistics of plastic packaged beverages?
- ii. How do financial incentives affect end users' participation in the reverse logistics of plastic packaged beverages?
- iii. What is the level of awareness among end users on RL of plastic packaged beverages?

1.5 Justification of the Study

This study is in line with the East African Community's (EAC) Vision 2050, which emphasizes the need for "sustainable resource utilization, environmental management, and greater value addition." The outcomes of this study are again anticipated to contribute to the attainment of the United Nations Sustainable Development Goals (UNSDGs) for 2030, particularly goals 3,11 and 15. The research will provide valuable insights for local authorities in aligning with the Sustainable Development Goals, based on the research findings and recommendations.

The study holds significant implications for both academia and companies. Plastics have become an indispensable part of our daily lives, contributing to various sectors such as packaging, consumer goods and electronics. However, the improper disposal and management of PPBs wastes have led to severe environmental consequences. Reverse logistics, encompassing activities such as collection, sorting, and recycling, offers an effective solution to mitigate these issues. Understanding the role of end users in this process is crucial as they play a pivotal role in the consumption and disposal of PPB products. By investigating their participation, this study aims to provide valuable insights into optimizing the performance of reverse logistics systems, leading to more sustainable and efficient PPBs waste management practices.

The findings of this study will be of great relevance to companies and industry practitioners involved in plastic manufacturing, packaging, and retail sectors. Understanding the factors that influence end users' participation in reverse logistics will enable companies to design and implement effective strategies to encourage consumers' involvement in recycling and reusing PPBs products. By incorporating the insights gained from this research, companies can optimize their reverse logistics operations, reduce their environmental footprint, and enhance their sustainability performance. Moreover, the findings will help companies identify potential barriers and challenges faced by end users in participating in reverse logistics, allowing them to tailor their communication and education campaigns accordingly.

This study has significant implications for consumers, local communities, and policymakers. End users' active involvement in reverse logistics can foster a sense of responsibility and environmental awareness among consumers. By understanding the motivations and barriers that influence end users' participation, policymakers can

develop targeted policies and regulations to promote sustainable waste management practices and foster a circular economy. Additionally, this research can contribute to the development of educational campaigns and initiatives aimed at raising awareness among consumers about the importance of recycling and reusing PPBs products. Ultimately, the study's findings can empower individuals, communities and policymakers to make informed decisions and take actions that contribute to a more sustainable and eco-friendly society.

1.6 Organization of the Study

This study is organized into five chapters. The first chapter of the study covers the study's background information, research problem, research objectives, research questions and justification of the study. The second chapter includes a review of the literature relevant to the study, divided into four categories: definition of key terms, theoretical literature review, empirical literature review, research gap and conceptual framework. The third chapter is about research methodology, which includes research design, target population, types of data and data collection method, Sample size, sampling technique, validity and reliability of data, data analysis and ethical consideration. Chapter four addresses the findings and discussion. Chapter five covers the summary, conclusion and recommendations that arise from the findings of the study. Likewise, the study recommends areas for further study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Definition of Key Terms

2.1.1 Reverse Logistics

Tibben Lembke and Rogers (2002) produced one of the widely used definitions of reverse logistics (RL). They describe RL as “the movement of product or materials in the opposite direction for the purpose of creating or recapturing value, or for proper disposal”. Nevertheless, processes have been described by many other authors from different viewpoints. In their work, they identified several different RL practices such as reuse, resale, redistribute, recycle, repair, refurbished, remanufacturing, retrieval, and incineration (Fleischmann *et al.*, 2000; Guide and Wassenhove, 2003; Brito and Dekker, 2004). However, one of the most under-investigated areas in RL is how to deal with “end-of-life” or “end-of-use” products (Xie and Breen, 2014), particularly regarding recycling or disposal of them. For the purpose of this study, RL is defined as the process that involves the collection, sorting and transporting of plastic packaged beverages waste by end users to the collection point so that manufacturers take them for reusing, recycling or proper disposal.

2.1.2. End-Users

According to Qazzafi *et al.* (2019), end users refer to individuals who consume or utilize products for their own use. Thus, this study treats end users as the final recipients or consumers who possess or dispose of plastic packaged beverage wastes, either through sorting or returning them to the collection point for proper disposal or recovery.

2.1.3 Reverse Logistics Performance

Elimelech *et al.* (2018) defined reverse logistics performance as the effectiveness and efficiency of the processes and activities involved in the management of product returns, recovery, and disposal within the supply chain. It evaluates the ability of a system to handle the reverse flow of products, such as plastics, from end users back to the manufacturer or appropriate recycling or disposal facilities. In this study, reverse logistics performance was measured by considering the number of end users who are

willing to participate and those who have already participated in sorting and returning plastic packaged beverage waste to the designed places for proper disposal.

2.1.4 Financial Incentives

As described by Lieberman (2021) financial incentives refer to monetary rewards or any other benefits provided to individuals or organizations to motivate desired behaviours. In this study of end users' participation in the reverse logistics performance of plastics, financial incentives include financial rewards and discounts offered to end users for their active engagement in returning or recycling plastic packaged beverages waste.

2.1.5 Participation

Julianelli *et al.* (2020) defined the term participation as the active involvement or engagement of individuals or organizations in a specific activity or process. In the context of this study, participation refers to the voluntary actions taken by end users to participate in the reverse logistics performance of plastic packaged beverage wastes, such as sorting and returning used plastic products to designated collection points or engaging in recycling initiatives.

2.1.6 Behavioural Intentions

According to Nezamova and Olentsova (2020), behavioural intentions represent an individual's subjective probability or readiness to engage in a specific behaviour. In the context of this study, behavioural intentions refer to end users' personal feelings or motivations to participate in the reverse logistics performance of PPBs wastes, which include their willingness to sort, return or properly dispose of PPBs products based on their attitudes, subjective norms, and perceived behavioural control.

2.2.1 Theoretical Review

The study employed the Theory of Planned Behaviour (TPB) and Random Utility Theory (RUT) to explain end users' participation in the reverse logistics performance of plastic packaged beverages waste where TPB is used as the leading theory and RUT as the supporting theory.

2.2.1.1 Theory of Planned Behaviour

The theory of Planned Behaviour (TPB) was propounded by Iceke Ajzen (1991) assumes that an individual's intention to engage in a particular behaviour is determined by three key factors: attitude (ATT), subjective norms (SN) and perceived behavioural control (PBC) (Shufiana *et al.*, 2021). In the context of this study on end users' participation in the reverse logistics performance of PPBs, an attitude refers to end users' beliefs and perceptions toward behaviour on participation in the PPBs wastes collection and sorting process. Subjective norms encompass the perceived social pressure from others, such as peers, family, and society, regarding the involvement in reverse logistics practices of PPBs wastes. Perceived behavioural control captures end users feeling in control of participating in the reverse logistics performance of PPBs wastes. Therefore, using TPB, one can gain valuable insights into the factors that influence end users' intentions to participate in the reverse logistics performance of PPBs and identify strategies to promote their engagement. However, TPB has limitations as it does not consider environmental or economic factors that may influence an individual's intention to perform behaviour.

Several researchers have applied TPB to understand people's intentions to engage in a particular activity (Kianpour *et al.*, 2017; Khan *et al.*, 2019; Wang *et al.*, 2019). For instance, Khan *et al.* (2019) used TPB in their study to determine the factors that affect customers' intention to engage in reverse logistics practices. Furthermore, Sari *et al.* (2021) applied the same theory to analyse consumer intention to participate in E-waste collection programs to enhance reverse logistics. A similar approach also was applied in the study to analyse end users' environmental awareness in reverse logistics practices of plastic waste (Ding *et al.*, 2022). Therefore, this study used The Theory of Planned Behaviour to investigate whether end users' behavioural intention factors, financial incentives and awareness have impacts on the reverse logistics performance of PPBs wastes.

2.2.1.2 Random Utility Theory

Random Utility Theory (RUT) by McFadden (1974) is built on the assumption that an individual maximizes his utility from discrete choices on a given set of alternatives. People generally choose what they prefer and where they do based on the highest utility

obtained (Rejikumar *et al.*, 2019). This means that individuals make rational decisions by evaluating the utility associated with different alternatives and choosing the option that yields the highest utility. In the context of this study on end users' participation in the reverse logistics performance of PPBs, RUT was applied to analyse the utility that individuals derive from engaging in such activities compared to alternative disposal methods. By estimating the utility associated with different factors, such as environmental impact, convenience, and potential incentives like monetary rewards, we can then quantify individuals' preferences and predict their choices. Incorporating RUT into this study allows us to assess the relative importance of different economic and environmental factors that influence end users' decisions regarding reverse logistics participation and develop effective strategies to incentivize their engagement.

Researchers such as Kianpour *et al.* (2017) used the Random Utility Theory to investigate the factors influencing consumers' intention to adopt reverse supply chain management to return end-of-life electronic items for reuse and repair in Malaysia. On the other hand, Abila (2019) also employed Random Utility Theory to examine the influence of financial incentives to participate in reverse logistics performance in Finland. The study by Frei *et al.* (2020) employed a similar theory to analyse sustainable reverse supply chains and circular economy in multichannel retail returns. All these studies highlight some aspects that influence people's ability to make informed decisions and their willingness to act.

2.2.2 Empirical Literature Review

Several empirical studies including (Mwanza *et al.*, 2018; Gong *et al.*, 2019; Abila, 2019; Linh *et al.*, 2019; Khan *et al.*, 2019; Cavaliere *et al.*, 2020; Sabbir *et al.*, 2022; Sari *et al.*, 2021; Ding *et al.*, 2022; Thilakarathne *et al.*, 2022; Abdissa *et al.*, 2022) have examined various aspects of end users' impact on reverse logistics performance. Ding *et al.* (2022) utilized descriptive statistics to examine end users' environmental awareness in reverse logistics practices concerning plastic waste. Based on the responses to their closed-ended questions, they found that people lack knowledge about which plastics can be reused or recycled and they show no interest in returning plastic waste to collection points for recycling and reusing. However, their reliance on closed-ended questions, may not capture the full spectrum of end users' perspectives and behaviours. Therefore, this study on end users' participation in reverse logistics performance aims to investigate

deeper into these issues deeper by adopting a mixed-methods approach, including both qualitative and quantitative research methods to provide a more comprehensive view of end users' attitudes and behaviours regarding RL performance of PPBs. Additionally, studies by Amole *et al.* (2018) applied a multinomial logistic regression model to examine reverse logistics awareness and waste management in manufacturing companies. They found that manufacturers are aware of reverse logistics practices and believe that reverse logistics activities arising from waste products are significant in achieving organizational goals. However, Fikru (2020) assessed the level of understanding of reverse logistics concepts in the community, particularly in bottled water and soft drink production companies in Ethiopia and found that the management and employees of those companies lack comprehension of reverse logistics practices and their importance. This knowledge gap contributes to the low interest and limited engagement of individuals in returning plastic waste for recycling purposes. These findings highlight the importance of educational initiatives aimed at enhancing public awareness about the benefits of reverse logistics and the proper handling of plastic waste. Additionally, this finding suggests that there may be a disconnect between manufacturers' understanding of reverse logistics and the awareness levels of end users but did not indicate the connection between companies and end users and how they can work together to improve RL performance. Therefore, this study aimed to bridge this gap by disseminating information and promoting collaboration between manufacturers and end users which lead to more effective reverse logistics practices.

Abila (2019); Correia *et al.* (2021); Marić and Opazo-Basáez (2019) utilized various empirical models and analyses in their studies to analyse the role of financial incentives in encouraging participation in reverse logistics practices. Most of them used descriptive and inferential analysis and concluded that financial incentives are crucial for motivating end users to engage in reverse logistics practices. For instance, Abila (2019) found a positive relationship between the provision of financial incentives and end users' willingness to participate in reverse logistics activities. In this study, Abila interviewed students and staff members from the five higher education institutions in Finland. The study also revealed that the majority of developing nations pay little attention to the importance of incentives as a means of motivating end users to participate in reverse logistics performance. It also advised conducting similar studies in other countries. However, it is concerning that the majority of developing nations have

yet to prioritize the implementation of incentive programs, the above study did not recommend how policymakers and government can implement such a system to improve reverse logistics performance of plastic packaged beverages of which the study will shed light.

Quantitative studies done by Khan *et al.* (2019); Sari *et al.* (2021); and Sabbir *et al.* (2022) to understand the influence of consumers' behavioural intentions towards participating in reverse logistics performance of plastic waste. Some researchers utilized multinomial logistic regression models while others used Partial Least Square structural equation modelling (PLS-SEM). As a result, they discovered that attitude, convenience, subjective norms, cultural norms and perceived behaviour control as the main factors influencing consumer behavioural intentions when it comes to participation in reverse logistics. However, while the studies have made significant steps in understanding the factors driving consumer behaviour in reverse logistics, there remains a gap in the literature concerning the role of end users in the overall performance of reverse logistics systems. This research seeks to address this gap by placing a specific focus on the perspective and experiences of end users, allowing for a deeper exploration of their motivations, challenges and preferences in participating in reverse logistics processes.

Furthermore, a study by Thilakarathne *et al.* (2022) employed PLS-SEM to examine factors affecting reverse logistics performance in the plastic supply chain and revealed various factors, including market, policy, law, leadership, technology, knowledge and awareness. In the conclusion, the study disclosed that while other factors showed a positive connection with performance, they did not demonstrate significant positive significance. However, policy and legislative aspects were found to be significant in affecting reverse logistics performance. However, some of these factors may have a more pronounced impact than others. For instance, the study suggests that policy and legislative aspects play a significant role in shaping reverse logistics performance. This aligns with this study's interest in end users' participation in reverse logistics, as it opens up a compelling avenue for further exploration. By considering the end-user perspective, the research aims to bridge the gap left by Thilakarathne *et al.* (2022) and provide a more complete understanding of how knowledge sharing and environmental awareness can be leveraged to optimize reverse logistics performance while involving end users actively.

Mwanza *et al.* (2018) also evaluated household involvement in reverse logistics performance of plastic solid waste (PSW) in Zambia. Using descriptive statistics, the study results indicated that although the respondents are aware of the dangers of plastic solid wastes and how they can be well disposed of, they could not willingly participate in the program. Therefore, there is a need for interventions to motivate them to participate. While their findings emphasize the need for interventions to motivate participation, they do not investigate deeply the reasons behind this unwillingness. Therefore, this research seeks to uncover the underlying factors that hinder end-user engagement and provide actionable solutions. The study by Cavaliere *et al.* (2020) evaluated the factors influencing customers' decision to avoid plastic packaging. Using a Structural Equation Modelling (SEM) approach, the study found customers' concerns about plastics to be a major factor in avoiding plastic packages. While this is a crucial insight, it primarily focuses on avoidance rather than active participation in reverse logistics practices. This research aimed to complement this by exploring strategies to transition customers from avoidance to active involvement in plastic waste management. Furthermore, Linh *et al.* (2019) examined the behavioural intentions of customers concerning the reverse logistics performance of plastics using PLS-SEM, the results revealed that knowledge, attitude, subjective norms and perceived behavioural control affect a consumer's ability to participate in the recycling of plastic waste. However, their analysis lacks a comprehensive examination of the practical strategies required to connect these factors effectively. Therefore, this study not only validates these factors but also guides how to leverage them to enhance end-user engagement.

Additionally, Abdissa *et al.* (2022) examined the role of reverse logistics in recycling used plastic bottles and waste management in Ethiopia. The study used a descriptive study design and utilized both primary and secondary data sources. The study also found that reuse and remanufacturing are rarely practised and have become less popular. Despite the existence of standards for plastic waste disposal, there is a lack of community understanding of solid waste management and some stakeholders actively disregard waste management regulations. However, while their findings are crucial in identifying systemic issues, this study intended to build upon this foundation by proposing practical interventions that can bridge these gaps and promote sustainable reverse logistics performance of PPBs wastes.

2.2.3 Research Gap

The topic of reverse logistics is fairly covered by academicians, however, as discussed in the paragraphs above, researchers such as (Amole *et al.*, 2018; Fikru, 2020; Ding *et al.*, 2022) have reported mixed results, making it difficult to reach a definitive conclusion. Furthermore, there is a lack of comprehensive understanding and awareness among end users regarding the significance and implementation of reverse logistics (RL) in managing plastic packaged beverage wastes. Additionally, most of the evaluated studies did not clearly show the contribution of end users in reverse logistics performance as their main focus was the employees and managers of companies. As the practice of RL is fairly new in developing countries and the magnitude of the problem is vast, limited studies have been done to demonstrate the effects of end users' participation in RL practices specifically on plastic packaged beverages. Therefore, it is evident that there is a knowledge gap that needs to be filled through research. This study aimed to bridge this gap by providing knowledge on the performance of RL of plastic packaged beverages through end users' participation in Moshi Municipality, Tanzania.

2.2 Conceptual Framework

The theory of Planned Behaviour suggests that attitude, subjective norm, and perceived behavioural control play a significant role in determining end users' participation in the reverse logistics performance of plastic packaged beverage wastes. On the other hand, the Random Utility Model assumes that an individual's preferences among available alternatives can be described by a utility function, leading them to choose the alternative with the highest utility. This study incorporates both theories to examine the relationship between independent variables (end users' behavioural intentions factors, role of financial incentives, and awareness) and the dependent variable of reverse logistics performance. The independent variables were measured by assessing various factors, including attitude, subjective norms, perceived behavioural control, level of returning plastic packaged beverages (PPBs), increased desire to return PPBs waste, awareness promotion of PPBs waste returning, motivational factors for returning PPBs waste, sustainable methods of returning PPBs, knowledge, willingness, and potential dangers. On the other hand, the dependent variables were measured by evaluating engagement (the number of end users willing to participate in sorting and returning PPBs) and participation (the number of end users who have already participated or are currently participating in the process of collecting and sorting PPBs waste).

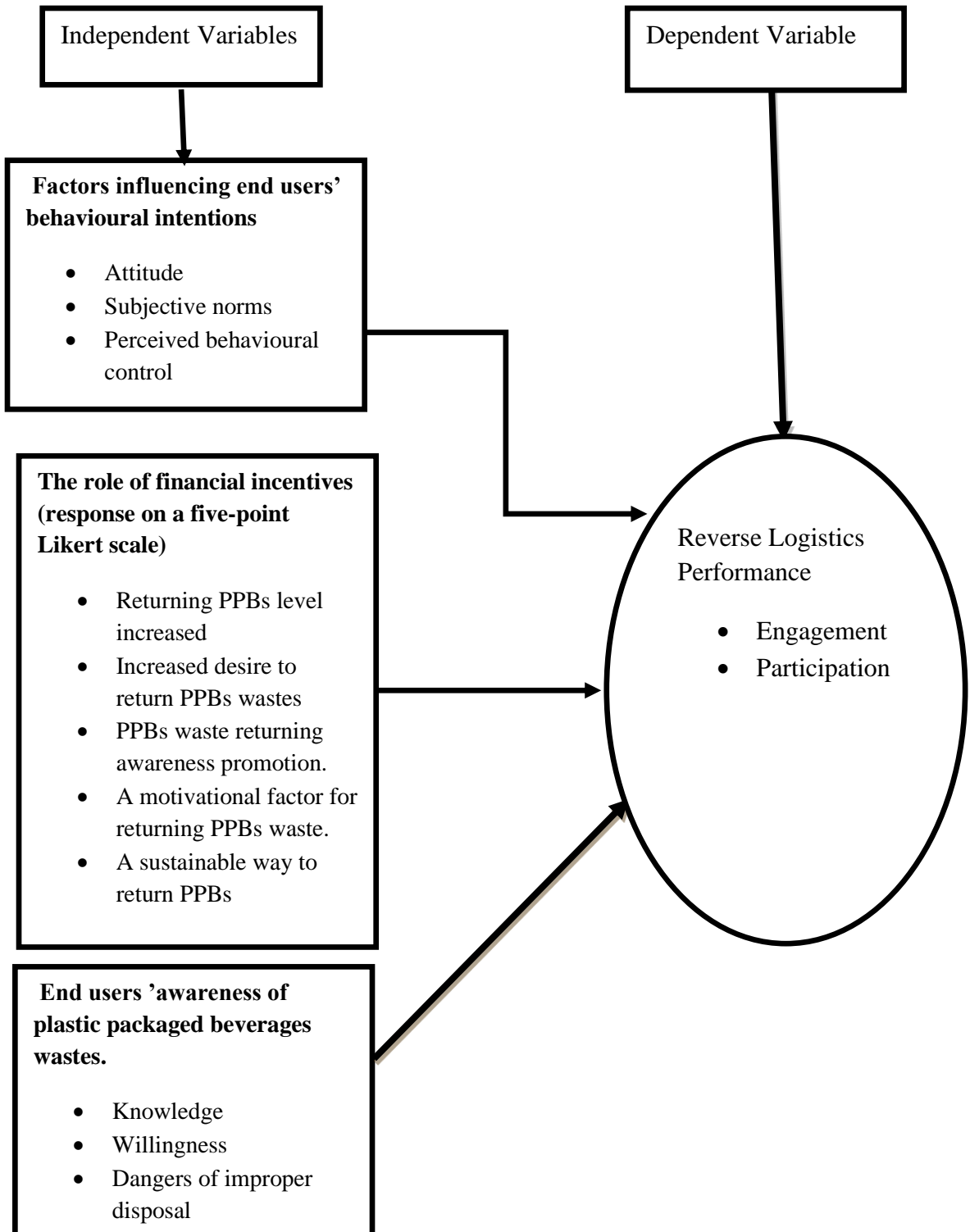


Figure 1 : Conceptual Framework

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

The study adopted a cross-sectional survey research design. The design was used to collect data at a single point in time. Since this study aimed to analyse the end users' participation in the reverse logistics performance of plastic packaged beverages, the cross-sectional research design allowed the researcher to collect data on a wide range of variables of interest from a large number of participants in a relatively short period. Researchers argue that a cross-sectional design works well to investigate data collected at a single point in time (Xu *et al.*, 2020).

3.2 Geographical Coverage

The study was carried out in the Moshi Municipality, Kilimanjaro region, in the North-Eastern part of Tanzania. The study area was chosen because Moshi Municipality, a mid-sized city, is ignored in other studies that focus on large cities like Dar-Es-Salam. Additionally, Moshi Municipality demonstrated inadequate waste management in handling plastic packaged beverages and minimal end-users' involvement in the process, with 60% of household plastic waste including plastic packaged beverages being burned, discarded by the roadside, or poured into drainage canals (National Environmental Action Plan, 2018). Additionally, researchers such as Singh's (2022) argue that a study area should be selected based on its capacity to offer the necessary data. Also, factors like time constraints, familiarity with the area and the likelihood of acquiring the needed data determine the viability of any research. Thus, the researcher considered all these factors in selecting the study area for the research project.

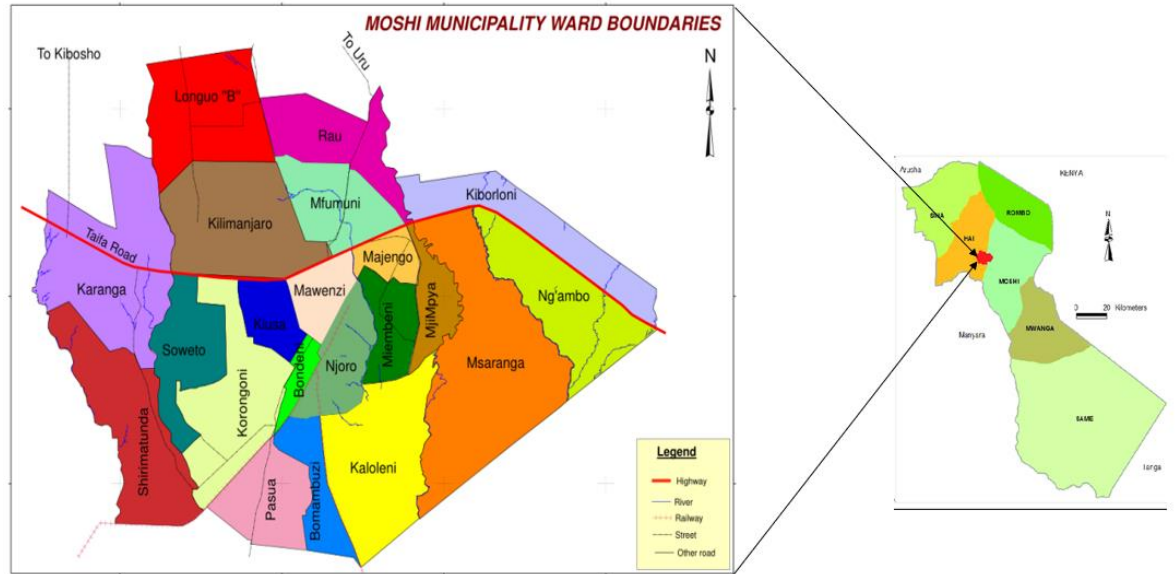


Figure 2 : Moshi Municipality Map

3.3 Sampling

3.3.1 Target Population

The target population was all residents of Moshi Municipality in the investigation. The 2022 national population census estimated the population of Moshi Municipality to be 184,292 residents (NBS, 2022), hence the study targeted all people living within the Moshi municipality. As such, the unit of analysis was end- users of PPBs and the unit of observation was one member of the household who is above 18 years old, as according to the government of Tanzania laws, anyone above this age is considered as an adult and can make decisions independently.

3.3.2 Sample Size and Sampling Strategies

3.3.2.1 Sample Size

The study selected a sample of 400 respondents to participate in the study. The sample was calculated using the formula of Yamane (1967) to determine the sample size of the study. Yamane's (1967) formula is applied because there is a finite and known population size of 184,292. In addition, the formula has a very high level of accuracy providing only a 5% margin of error. As such, the sample size of the study under Yamane's (1967) formula was 400 respondents as calculated below:

$$n = \frac{N}{1+N(\varepsilon)^2}$$

Whereas n = sample size,

N = Population size

ε = margin of error

$$n = \frac{184,292}{1 + 184,292(0.05)^2} = 400$$

Thus, the sample size was 400 respondents.

3.3.2.2 Sampling Techniques

A simple Random sampling strategy was employed to select 400 respondents. Since it is a robust technique that ensures everyone in the population has an equal chance of being selected for the study. By utilizing this method, the researcher aimed to eliminate.

bias and enhance the generalizability of the findings. To implement simple random sampling, the researcher first obtained a comprehensive list of all residents in Moshi Municipality and assigned each individual a unique identification number. Next, using a computer (Excel), random numbers were generated from all assigned numbers, and the corresponding member was automatically chosen to participate in the research. This process ensured that each resident had an equal opportunity to be included in the sample, thereby minimizing the chance of selection bias.

3.4 Data Collection

3.4.1 Types of Data

Both qualitative and quantitative data were collected to answer the research objectives. A combination of closed and open-ended questions was used to obtain both quantitative and qualitative data. Since some issues can not only be fully answered with a specific form of data, the two types of data were used to complement one another.

3.4.2 Source of Data

Both primary and secondary sources of data were used to derive an understanding of end users' participation in the reverse logistics performance of PPBs. Primary data was collected through surveys and interviews, allowing for direct interaction with the participants and exploration of unique perspectives. Meanwhile, secondary data was gathered from scholarly articles, books, and reports, enabling an extensive review of existing knowledge. By integrating both sources, the study benefited from the strengths of each approach, thereby, enhancing the validity and reliability of the findings.

3.4.3 Data Collection Techniques

3.4.3.1 Survey Questionnaire

To obtain quantitative data from participants, the study employed a self-administered survey questionnaire. A self-administered survey is one in which the respondent fills out the questionnaire on their own, without the help of an interviewer. The method of distribution, which is typically used to reach many people was in-person, and it was done with paper and a pen. Therefore, it made it possible to collect data quickly and accurately from a large number of respondents by using a survey questionnaire.

To measure respondents' participation, a five-point Likert scale was employed to gather data from the survey questionnaire. The participation was ranked in descending order from strongly disagree to strongly agree on a scale of 1 to 5. The responders were required to mark whether they strongly disagreed (1), disagreed (2), neutral (3), agreed (4), and strongly agreed (5) with the statement by checking in the appropriate boxes. A mean index developed by Kalatya and Moronge (2017) was employed in the study, where a mean of 1.0 to 2.5 showed not agreed, a mean of 2.6 to 3.4 identified neutrality, and a mean of 3.5 to 5.0 indicated agreed upon. Using the mean index, the ordered responses were converted to numerical data for feeding into the model.

3.4.3.2 Key Informant Interview

The study also used an interview technique to gather valuable insights obtained through interviews conducted with key informants who were environmental officers at the ward level. This was conducted to provide additional information on a few items that were not exhausted through the survey questionnaire. The selection of participants was

deliberately focused, ensuring a representative sample that provided the diverse perspectives and experiences of environmental officers across different wards. To achieve this, a purposive sampling approach was employed whereby five officers were chosen from five wards out of a total of 30. These methods allowed for a comprehensive understanding of the specific challenges that make the reverse logistics performance of PPBs wastes not improved. The selection was based on their personal knowledge and experience on the reverse logistics performance of plastic packaged beverages and interviews were conducted in Kiswahili language.

3.5 Assurance of Data Validity and Reliability

3.5.1 Data Reliability

To guarantee the reliability of the study, Cronbach's alpha (α) as a measure of internal consistency was used. Andrew (2020) argued that a reliability coefficient (alpha scale) of $\alpha \geq 0.7$ is considered good for a study. Since a lesser value is an indication of low internal consistency reliability hence considered unacceptable by (Creswell, 2014). Therefore, the average alpha scale obtained was 0.81 which is quite acceptable reliability (Table 1).

Table 1 : Reliability Test

Constructs/Variables	N of Items	Cronbach's Alpha
Behavioural intention factors	14	0.774
Roles of financial incentives	5	0.897
End users' awareness	14	0.795
Average	11	0.81

3.5.2 Data Validity

To ensure validity, the questionnaire and interview guide were pre-tested through a pilot study and 10% of the sample size was selected randomly and studied to check if data tools were giving the intended results. According to Meera (2017), a pre-test of 10% of the sample size is adequate to represent the chosen population. This was accomplished by asking experts to review and offer suggestions for rewording questions that are poorly stated or not objective and training was also done for the research assistant. Content validity was then tested using a content validity index (CVI). CVI assesses the

extent to which the questions in the questionnaire capture the intended content domain. Therefore, CVI was determined by dividing the number of valid questions (19) by the number of total questions (21) leading to a CVI of 0.9. According to Amin (2005), CVI of above 0.5 is highly recommended. $CVI = \frac{\text{Number of valid questions}}{\text{Total number of questions}} = \frac{19}{21} = 0.9$

3.5.1.1 Piloting Process

To conduct a pilot study, the researcher randomly selected 40 respondents from the larger sample of 400. This 10% subset was chosen to ensure the representative distribution of the participants across various demographic characteristics and target population. The researcher employed a systematic method to ensure the randomness of the selection process. Each respondent's identification number was assigned a sequential number from 1 to 400, and then using a computer (Excel), the researcher selected 40 numbers. These numbers correspond to the identification numbers of the chosen respondents for the pilot study.

After selecting the pilot study participants, the researcher distributed a modified version of the questionnaire to them. The modification included minor adjustments to the wording and formatting of certain questions to improve the clarity and ease of understanding. This helped to identify any potential issues or ambiguities in the questionnaire design and the modified questionnaire was distributed via face to face. The pilot study participants were encouraged to provide feedback and suggestions regarding the questionnaire to further refine its content and structure. The pilot study was valuable in identifying areas for improvement and ensuring the validity and reliability of the questionnaire before administering it to a larger sample of 400 respondents. Table 2 Summarises the feedback and modification of the questionnaire.

Table 2 : Findings from Piloting

Comments	Suggestions
Language	Researcher was advised to translate question into Kiswahili for easily understandable.
Age category	For particular comment the question was re-written as; what is your age category? a) 18-25, b) 26-30, c) 31-40 and above 40
Family size	The family size was re-written and indicated as members of households
Level of ranking five-point Likert answers	The participation was ranked in descending order from strongly disagree to strongly agree on a scale of 1 to 5.

3.6 Data Analysis

3.6.1 Data Preparation

The following are the processes used to prepare collected data: screening of the questionnaire, data editing, data coding and data transformation.

3.6.1.1 Screening of the Questionnaire

The screening questionnaire used in this study aimed to identify eligible participants based on specific criteria relevant to the research objectives. The questionnaire consisted of a series of closed-ended questions designed to efficiently capture essential demographic information and key variables related to the research topic and open-ended questions. Questions were carefully developed based on a thorough review of the literature and consultation with experts. The screening questionnaire included items such as age, gender, educational background, and relevant experience to ensure that participants met the predetermined inclusion criteria. Additionally, specific questions were incorporated to assess participants' familiarity with the subject matter and their willingness to participate in the reverse logistics performance of PPBs wastes. To enhance the reliability and validity of the questionnaire, a pilot test was conducted with a small sample to evaluate the clarity, comprehensibility, and effectiveness of the questions. Feedback from the pilot study was used to refine the questionnaire, ensuring its appropriateness and suitability for the target population. Overall, the screening questionnaire provided a systematic and standardized approach to identify eligible participants for the research study, thereby ensuring the collection of relevant data to address the research objectives.

3.6.1.2 Data Editing

The data editing process in this study involved several steps to ensure the accuracy and reliability of the collected data. Firstly, all raw data were carefully reviewed and evaluated for any inconsistencies and errors. Any identified discrepancies were then addressed which included cross-checking with the sources and conducting data verification with participants when necessary. Subsequently, data were coded and categorized based on predetermined criteria, allowing for easier analysis and interpretation. Furthermore, statistical software (SPSS) was employed to perform data cleaning procedures, such as identifying outliers and resolving any formatting issues.

This data editing process ensured the integrity and quality of the data, enhancing the validity and reliability of the findings obtained from this study.

3.6.1.3 Data Coding

Under this study, a systematic and rigorous process of data coding was employed to analyse the quantitative and qualitative data collected from the field. Data coding involves assigning numerical or categorical codes to the responses or variables in the dataset. The software package SPSS was used to facilitate the coding process and manage the data. Overall, the data coding process was rigorous, transparent and iterative, allowing for deep exploration of the data and the extraction of meaningful insights. Additionally, this process facilitates analysis by transforming qualitative or textual data into a format that can be easily quantified and analysed statistically.

3.6.1.4 Data Transformation

The data transformation process in this study involved several steps to prepare the raw data for analysis. First, the collected data, comprising survey responses and demographic information, was carefully reviewed for accuracy and completeness. Any missing or erroneous entries were identified and addressed accordingly. Subsequently, data cleaning techniques were employed to remove outliers and handle any inconsistencies in the dataset. This included removing duplicate records, correcting formatting errors and standardizing variables. Once the data was cleaned, it underwent a process of recording and reformatting to ensure compatibility with the statistical software used for analysis. Variables were recoded into meaningful categories and numerical scales were adjusted as appropriate. Finally, the transformed dataset was verified for accuracy and integrity before being used for subsequent analysis. This rigorous data transformation process ensured the reliability and validity of the data used in this study.

3.6.2 Analysis Technique

The study used Partial Least Square Structural Equation Modelling, Descriptive statistics, and Inferential analysis to analyse the collected data to achieve its objectives. For the analysis, the first objective used Partial Least Square Structural Equation Modelling grounded in the studies by Khan *et al.*, (2019) and Cavaliere *et al.*, (2020) to test whether the factors influencing behavioural intention can affect the reverse logistics performance of plastic packaged beverage wastes. The Partial Least Square Structure

Equation Model (PLS-SEM) was used to test the relationship between latent variables (attitude, subjective norms, and perceived behavioural control) and observed or endogenous variables. By using Smart PLS4 software to analyse the data, it was easy to assess the measurement model to test the validity and reliability of the data. Further, the structure model was tested to assess the relationship between independent and dependent variables. To express the relationship between the latent variables attitude (ATT), subjective norms (SN), perceived behavioural control (PBC), and reverse logistics performance (RLP), the Partial Least Squares Structural Equation Modelling (PLS-SEM) model used the following equation:

$$\text{RLP} = \lambda_1\text{ATT} + \lambda_2\text{SN} + \lambda_3\text{PBC} + \varepsilon$$

Whereby:

- RLP represents the reverse logistics performance, which is the dependent variable.
- ATT, SN, and PBC represent the latent variables attitude, subjective norms, and perceived behavioural control, respectively, which are the independent variables.
- λ_1 , λ_2 , and λ_3 are the path coefficients or factor loadings that represent the strength of the relationship between the independent variables and the dependent variable.
- ε represents the error term or residual, which accounts for unexplained variance in the dependent variable that is not captured by the independent variables.

The second objective was analysed by using descriptive statistics and inferential analysis adopted from previous researches similar to this study (Abila *et al.*, 2019; Corriere *et al.*, 2018). This study used descriptive statistics because it allows for the summarization and presentation of key characteristics in the dataset. By employing measures such as mean, standard deviation and frequency distribution, descriptive statistics provide a clear understanding of the central tendencies and distribution of variables related to financial incentives and reverse logistics performance. Additionally, inferential analysis plays a role in drawing meaningful conclusions and making valid inferences about the broader population based on the observed sample. The inferential analysis enables researchers to examine the relationships between financial incentives and the reverse logistics performance of PPBs. Moreover, to analyse the third objective

of the study, descriptive statistics are grounded in the studies by (Mwanza *et al.*, 2018 and Ding *et al.*, 2022). The analysis of the data involved percentage, frequency, mean and standard deviation.

3.7 Ethical Consideration

Ethics in research refers to the norms and standards of conducting the study (Simpson, 2022). The participants who completed the questionnaire were informed about the purpose of data collection, and analysis and the promise to maintain privacy of their responses. Therefore, research participants were not subjected to any harm; respect for the dignity of research participants was prioritized. Regarding published and unpublished materials used in the literature review and throughout the study, all citations from copyright holders were made properly. In short, during the research processes, all norms and standards were followed. Collected data was not used for other purposes other than study and Moshi Co-operative University guidelines were respected.

CHAPTER FOUR

4.0 FINDINGS AND DISCUSSION

This chapter presents the results obtained from the data collected through a questionnaire and interviews conducted with a sample of households in Moshi Municipality, Tanzania. The analysis is based on the specific study objectives, and the findings are divided into three sections. The first section focuses on the profile of end users' participation. It examines the extent to which end users are involved in the process of reverse logistics for plastic packaged beverages in Moshi municipality. The second section provides the social and economic characteristics of the respondents, while the third section analyses the findings about the study objectives.

4.1 Household Participation Profile

Understanding the level of end users' participation is crucial for effective reverse logistics practices concerning plastic packaged beverage waste. The primary aim of this study was to determine the influence of such participation on the performance of reverse logistics for plastic packaged beverage waste in Moshi, Tanzania. Initially, the study assessed participation by determining the willingness of end users to engage in the sorting and returning of plastic packaged beverages (PPBs), as well as whether they had previously participated in this process. The findings revealed that the majority of households, 254 respondents, expressed willingness to engage in the sorting and returning of PPBs, while 146 respondents did not. Moreover, the study indicated that 230 respondents had participated in the sorting and returning of PPBs at least once, whereas 170 respondents had never engaged in this process. The latter group cited the lack of reusable garbage bins and drop-off centres as some of the constraints preventing their involvement in the reverse logistics performance of PPBs. The household participation profile is summarized in Table 3 below.

Table 3 : Household Participation Profile (n=400)

Items	Responses	Frequency	Percent
Willingness of respondents to participate	No	146	36.5
	Yes	254	63.5
Whether respondents have ever participated before	No	170	42.5
	Yes	230	57.5

4.2 Social Economic Characteristics of the Respondents

To ensure the comprehensiveness of this study, it is crucial to provide a detailed description of the socio-economic characteristics of the respondents. The socio-economic status of the participants is presented in Table 4. Particularly, the study reveals that females dominate the sample, comprising more than half of the respondents (54.5%), while males cover (45.5%). This gender disparity indicates that females exhibit a greater willingness to engage in sorting and returning plastic packaged beverage (PPB) waste, compared to their male counterparts. Regarding marital status, the majority of respondents are married, constituting 58.5% of the sample. Single individuals account for 23.3%, separated individuals make up 10%, widowed individuals comprise 5.5% and divorced individuals represent 2.8% of the participants. This study aims to understand how different marital statuses influence respondents' responses toward participation in the reverse logistics performance of PPBs wastes.

Examining the age distribution of the respondents, the study finds that the largest proportion (31.5%) falls within the 26-30 years age interval. Those between 30-40 years account for 28.5%, while individuals above 40 years make up 28.3% of the sample. Participants aged between 18-25 years constitute 11.8% (Table 4). Moreover, the study identifies knowledge as a key driver influencing individuals' participation in reverse logistics practices. Notably, 64.7% of the respondents have completed tertiary education, indicating a highly qualified sample, while 35.3% have completed elementary education. Furthermore, the occupation of the respondents is considered important in this study, as it plays a role in decision-making processes. The analysis reveals that 39.8% of the end users are self-employed, 29% are unemployed, 22.8% are government employees, and 8.5% are privately employed (Table 4). This information is essential for assessing the participation in reverse logistics among employed and unemployed individuals.

Table 4 : Social Economic Characteristics of the Respondents (n=400)

	Demographic	Frequency	Percent
Sex	Male	182	45.5
	Female	218	54.5
Age	18-25	47	11.8
	26-30	126	31.5
	31-40	114	28.5
	above 40	113	28.3
	Primary	69	17.3
Education level	Secondary	72	18.0
	Certificate	43	10.8
	Diploma	71	17.8
	Bachelor	100	25.0
	Masters	43	10.8
	PhD	2	0.5
Marital status	Married	234	58.5
	Separated	40	10.0
	Widowed	22	5.5
	Single	93	23.3
	Divorced	11	2.8
Employment status	Unemployed	116	29.0
	Government employee	91	22.8
	Self employed	159	39.8
	private employees	34	8.5

4.3 Factors Influencing End Users' Behavioural Intention to Participate in Reverse Logistics of PPBs Wastes.

The first objective of the study was to determine the factors influencing end users' behavioural intention to participate in the reverse logistics performance of plastic packaged beverages (PPBs) waste in Moshi municipality. The purpose was to understand their opinions and views on how to engage in the collection and sorting of PPBs waste, which would improve reverse logistics performance, conserve the environment and reduce costs for beverage companies. To achieve this objective, a survey questionnaire, interviews and documentary reviews from various reverse logistics papers, social media, websites, and magazines were utilized.

Data analysis for this objective was conducted using Partial Least Squares-Structural Equation Modelling (PLS-SEM) as an estimation technique, employing the Smart PLS4 software. PLS-SEM is recommended over conventional SEM techniques due to its capability to explain more variance in complex models (Hameed *et al.*,2019). This

objective follows the two-stage approach discussed by (Hair *et al.*, 2017), which involves evaluating the measurement model and structural model.

4.2.1 Measurement Model

The measurement model is responsible for assessing the reliability and validity of the measurement indicators used in the study (Ahmad *et al.*, 2019). In this study, the measurement model is used to measure the quality of a construct. It employs various quality criteria, beginning with the evaluation of convergent validity, followed by the evaluation of discriminant validity.

4.2.1.1. Convergent Validity

Convergent validity refers to the degree of correlation between the measures of a construct (Neuman, 2007). It is considered achieved when the measuring items of a construct align with other items of the same construct (Hair *et al.*, 2017). The assessment of convergent validity involves four measures: factor loadings, composite reliability (CR), Cronbach Alpha and Average Variance Extracted (AVE). To establish convergent validity, the factor loading value should be 0.7 or higher. Additionally, both the composite reliability (CR) and Alpha values should be greater than 0.7. Lastly, the value of the Average Variance Extracted should be 0.5 or greater (Hair *et al.*, 2017).

Table 5 presents the results of factor loadings, Cronbach's Alpha, Composite Reliability (CR) and Average Variance Extracted (AVE). The reliability of the variables was assessed using CR and Cronbach's Alpha. All CR and Alpha values exceeded the recommended value of 0.7. Specifically, the values for attitude were 0.822 and 0.719, perceived behavioural control had values of 0.83 and 0.739, subjective norms showed values of 0.816 and 0.742 and RL performance 0.92 and 0.79 respectively. Furthermore, the AVE values for attitude, perceived behavioural control, subjective norms, and RL performance were equal to or greater than 0.5. Specifically, the AVE results were 0.53 for attitude, 0.514 for perceived behavioural control, 0.537 for subjective norms and 0.633 for RL performance. Moreover, the factor loadings which indicate the strength of the relationship between each item and its respective construct exceeded the recommended value of 0.7 and the p-values, which are all below the significance level of 0.05, suggest that the loadings are statistically significant, indicating that convergent validity was achieved under this objective. Therefore, the overall results of the

reliability tests (CR and Alpha), AVE values and factor loadings demonstrate strong reliability and validity of the measured variables which provide a solid foundation for further analysis and interpretation of the study's questions.

Table 5 : Reliability Testing and Convergent Validity Results.

Construct	Items	Loadings	P value	CR	AVE	Cronbach's alpha
ATT	ATT1	0.746	0.000	0.822	0.536	0.719
	ATT2	0.707	0.000			
	ATT3	0.731	0.000			
	ATT4	0.744	0.000			
PCB	PCB1	0.797	0.006	0.830	0.514	0.739
	PCB2	0.821	0.000			
	PBC3	0.794	0.000			
	PBC4	0.830	0.000			
	PBC5	0.700	0.000			
SN	SN1	0.777	0.000	0.816	0.537	0.742
	SN2	0.895	0.005			
	SN3	0.850	0.001			
	SN4	0.741	0.007			
Performance(P)	P1	0.902	0.000	0.920	0.633	0.790
	P2	0.876	0.000			

4.2.1.2 Discriminant Validity

Discriminant validity measures the degree to which a construct is different from other constructs (Kumar, 2019). Discriminant validity is about differentiating one construct from another, and it is achieved when the measurement items of a construct differentiate or discriminate from the measurement items of other constructs (Hair *et al.*, 2017). Discriminant validity is ensured through three measures: Cross Loadings, Fornell and Larcker Criteria, and Heterotrait Monotrait (HTMT) ratio of correlations. In this study, discriminant validity was assessed using all the above criteria.

According to the Fornell and Larcker Criteria, the diagonal values which are the square root of the Average Variance Extracted (AVE) should be higher than the off-diagonal values in each row and column to establish discriminant validity (Fornell and Larcker, 1981). In this case, the diagonal values in table 6 meet the criterion, as they are higher than the corresponding off-diagonal values. For example, the square root of AVE for

ATT is 0.732, which is higher than the correlations between ATT and SN (0.327), ATT and PBC (0.313) and ATT and P (0.019). This suggests that ATT is distinct from these other constructs and supports discriminant validity. Similarly, the AVE values for SN, PBC, and P are higher than their respective correlations with the other constructs, indicating discriminant validity. For instance, the AVE for SN is 0.733, which is higher than the correlations between SN and ATT (0.327), SN and PBC (0.09), and SN and P (0.065). therefore, all the results of the discriminant validity analysis based on the Fornell and Larcker Criteria provide evidence that the constructs in the study are distinct from each other. These findings support the idea that ATT, SN, PBC, and P are separate concepts and are measuring different aspects of the reverse logistics performance.

Table 6 : Correlations of Discriminant Validity Based on the Fornell and Larcker Criteria.

Construct	ATT	SN	PBC	P
ATT	0.732			
SN	0.327	0.733		
PBC	0.313	0.09	0.717	
P	0.019	0.065	-0.07	0.795

The discriminant validity was also tested using the criteria suggested by Heterotrait-Monotrait Ratio (HTMT) in Table 7. The HTMT ratio indicates whether the constructs in the model are different from each other. According to Henseler *et al.* (2015) The discriminant validity is established if the value of HTMT is less than 0.85. Therefore, the results of the Heterotrait-Monotrait (HTMT) ratio for discriminant validity assessment among the constructs of ATT, SN, PBC, and P are presented in the table 7 indicated that HTMT ratio between ATT and SN is 0.491, which is below 0.85, indicating discriminant validity between these two constructs. Similarly, the HTMT ratio between ATT and PBC is 0.397, suggesting discriminant validity between these constructs as well. The HTMT ratio between ATT and P is 0.048, indicating discriminant validity between ATT and P. The HTMT ratio between SN and PBC is 0.22, below 0.85, demonstrating discriminant validity between SN and PBC. Lastly, the HTMT ratio between SN and P is 0.05, and between PBC and P is 0.081, both below 0.85, indicating discriminant validity between these pairs of constructs is established.

Therefore, the results of the HTMT ratios support the discriminant validity of the constructs in this study. The values for all pair-wise comparisons are below the recommended value of 0.85, indicating that the constructs of ATT, SN, PBC and P are distinct from each other. These findings provide confidence that the measurement instruments used in the study are capable of capturing unique aspects of each construct, allowing for valid and reliable measurement of the variables in the study.

Table 7 : Discriminant Validity Results Based on Heterotrait-Monotrait Ratio (HTMT) Criteria.

Construct	ATT	SN	PBC	P
ATT				
SN	0.491			
PBC	0.397	0.22		
P	0.048	0.05	0.081	

Another approach to confirm discriminant validity is checking the cross-loadings of items. The cross-loadings within a construct should be higher than the cross-loadings between different constructs (Hair *et al.*, 2017). Under this study, it is observed that the items within each variable generally have higher cross-loadings compared to cross-loadings with items from other variables. For example, items ATT1, ATT2, ATT3, and ATT4 all have relatively high cross-loadings on the ATT construct, indicating a strong relationship between these items and the Attitude factor. Similarly, items SN1, SN2, SN3 and SN4 have high cross-loadings on the SN construct, indicating a strong relationship with Subjective Norms (see Table 8).

Furthermore, the cross-loadings between different constructs are generally lower than the cross-loadings within the constructs, supporting discriminant validity. For instance, the cross-loadings between ATT and SN, ATT and PBC and ATT and RL Performance are generally lower than the cross-loadings within each respective construct. This suggests that the items are more strongly related to their corresponding construct than to other constructs, confirming discriminant validity. Therefore, the results demonstrate that the items have stronger associations with their intended constructs than with other constructs, indicating good discriminant validity.

Table 8 : Discriminant Validity-Cross Loadings Results

ITEMS	ATT	SN	PBC	P
ATT1	0.746	0.242	0.162	0.032
ATT2	0.707	0.175	0.056	-0.038
ATT3	0.731	0.244	0.236	0.028
ATT4	0.744	0.274	0.377	0.021
PBC1	0.051	0.05	0.297	-0.032
PBC2	0.208	-0.03	0.821	-0.051
PBC3	0.314	0.101	0.794	-0.109
PBC4	0.305	0.047	0.83	-0.021
PBC5	0.182	0.224	0.7	-0.029
SN1	0.248	0.577	0.062	-0.002
SN2	0.217	0.895	-0.008	0.08
SN3	0.239	0.85	0.13	0.043
SN4	0.411	0.541	0.163	0.003
Perform1	0.345	0.273	0.065	0.976
Perform2	0.321	0.531	0.218	0.273

4.2.2 Structural Model

The structural model was used to assess the relationships between the independent variable (behavioural intention factors) and the dependent variable (reverse logistics performance of plastic packaged beverage waste). This study employed PLS-SEM as an estimation technique to examine these relationships. In this section, collinearity issues, path coefficients, coefficients of determination, predictive relevance, and effect size were assessed to establish the relationships between the variables. To assess collinearity, the Variance Inflation Factor (VIF) was calculated using SmartPLS 4 software. According to Gabbatiss (2018), a VIF value less than 3.3 indicates no potential issues with collinearity. Table 9 below shows that the VIF values are less than 3.3 (ATT=1.232; SN=1.763; PBC=1.733), indicating no collinearity issues and confirming that the model fits well with the data. Furthermore, after performing bootstrapping with 5000 subsamples, as suggested by Hair *et al.* (2017), the path coefficients were summarized in Table 9, The table presents the results of the Path Coefficients and Collinearity analysis, which examines the relationship between end

users' behavioural intention factors and reverse logistics performance. The analysis aimed to determine the direct effects of three factors, namely Attitude (ATT), Perceived Behavioural Control (PBC) and Subjective Norms (SN), on the outcome variable, which is Reverse Logistics Performance (P). The results indicated that attitude has a significant direct effect on the Reverse Logistics Performance of PPBs waste. The path coefficient (β) for ATT \rightarrow P is -0.175, P value of $0.004 < 0.05$). These values suggest a significant relationship between Attitude and Reverse Logistics Performance. Additionally, Perceived Behavioural Control (PBC) demonstrated a significant direct effect on the Reverse Logistics Performance of PPBs waste with the path coefficient (β) for PBC \rightarrow P is -0.098 , P value of $0.000 < 0.05$, indicating a significant association between Perceived Behavioural Control and Reverse Logistics Performance. Both results were consistent with previous research (Wan *et al.*, 2012; Chu and Chiu, 2003; Kochan *et al.*, 2016).

On the other hand, the results show that Subjective Norms (SN) do not have a significant direct effect on Reverse Logistics Performance. The path coefficient for SN \rightarrow P is -0.005, with p value of $0.9 > 0.05$), suggesting that there is no statistically significant relationship between Subjective Norms and Reverse Logistics Performance., which aligns with a previous study (Chen and Tung, 2010). Previous studies have consistently shown that subjective norms have an insignificant impact on reverse logistics practices (Dixit and Badgaiyan, 2016; Wan *et al.*, 2014; Chen and Tung, 2010). This suggests that individuals are unsure whether the community around them would appreciate and encourage their participation in these practices, as it is a personal decision that depends on their commitment and preferences. The study concludes that end users' participation in the reverse logistics performance of PPBs waste is primarily influenced by their attitude and perceived behavioural control, rather than subjective norms.

Table 9 : Path Coefficients and Collinearity Results (relationship between end users behavioural intention factors and reverse logistics performance).

Direct effect	Path coefficients(β)	SE	T statistics	P values	Remarks	VIF
ATT -> P	-0.175	0.061	2.863	0.004	significant	1.232
PBC -> P	-0.098	0.024	4.159	0.000	significant	1.733
SN -> P	-0.005	0.039	0.125	0.901	not significant	1.763

In this study, the researcher assessed the model's predictive accuracy using the coefficient of determination (R^2), Cross-validated redundancy (Q^2) and effect size (F^2) measurements. R^2 represents the overall impact of independent variables on the dependent variable (Hair *et al.*, 2017). R^2 also helps to determine the accuracy of the model, the coefficient of determination (R-square) measures the proportion of variance in the dependent variable (construct P) that can be explained by the independent variables (constructs ATT, PBC and SN) and must be ≥ 0.5 to indicate model fitness (Hair *et al.*, 2017). In this study, the R-square value for construct P is 0.551, indicating that approximately 55.1% of the variance in construct P can be explained by the independent variables. This means that the independent variables collectively contribute to more than half of the variability in construct P. indicating that the model establishes predictive relevance for the endogenous variable.

Cross-validated redundancy (Q^2) is another measure the researcher used to assess the model's accuracy. Q^2 evaluates the predictive relevance of the inner model (Godin *et al.*, 2019). The cross-validated redundancy (Q-square) provides an estimate of the predictive accuracy of the model. A Q-square value of 0.537 suggests that the model explains about 53.7% of the variation in construct P, as assessed through cross-validation. This indicates that the model has moderate predictive power, suggesting that the independent variables (ATT, PBC and SN) are reasonably good predictors of construct P.

Lastly, the effect size measures the strengths of the relationship between the independent variables (ATT, PBC and SN) and the dependent variable (construct P). According to Cohen (1988), The F^2 (≥ 0.02 is small; ≥ 0.15 is medium; ≥ 0.35 is large) In this study, the effect size is reported using F-square values. The F-square values for

ATT → P, PBC → P and SN → P are 0.115, 0.142, and 0.000, respectively. These values indicate the proportion of variance in construct P explained by each independent variable, after controlling for the other variables. A higher F-square value suggests a stronger effect. Among the independent variables, PBC has the highest effect size (0.142), followed by ATT (0.115). The SN variable appears to have effect (0.000) on construct P, indicating that it does not significantly contribute to explaining the variance in construct P. This means that even if subjective norms are removed from the model, there will be no significant change in the R-square of the dependent variable. Table 10 summarizes the values of R², Q² and F².

Table 10 : Coefficient of Determination, Cross-Validated Redundancy and Effect Size Results.

Coefficient of determination		
Construct	R square	Q square
P	0.551	0.537
Effect size		
	F square	P values
ATT → P	0.115	0.01
PBC → P	0.142	0.004
SN → P	0.000	0.521

The above findings are supported by the Theory of Planned Behaviour (TPB), which states that an individual's intention to engage in a particular behaviour is determined by their attitude, subjective norms and perceived behavioural control. Therefore, based on the results mentioned earlier, it can be concluded that end users' engagement in the reverse logistics (RL) performance of Plastic Packaged Beverages (PPB) wastes is influenced more by their attitude and perceived behavioural control rather than subjective norms. These results are further supported by previous empirical studies (Chu and Chiu, 2003; Wan *et al.*, 2012; Wan *et al.*, 2014; Kochan *et al.*, 2016; Dixit and Badgaiyan, 2016; Chen and Tung, 2010) that indicate a significant association between perceived behavioural control and RL performance, while the relationship between subjective norms and RL performance is found to be insignificant.

4.2.3 Perceived Barriers that Prevent End Users to Participate in Reverse Logistics Performance of PPBs Wastes.

Open-ended questions were utilized to gather qualitative responses from end users. The analysis of the responses revealed several key themes related to barriers that might prevent them from engaging in reverse logistics performance of PPBs wastes. The most frequently cited barrier was the lack of time which was encountered by 75% (n=301) of the total respondents. Participants expressed their difficulty in finding time to engage in reverse logistics practices such as sorting and returning the PPBs wastes. This finding highlights the importance of considering time constraints when designing strategies to enhance participation in the reverse logistics performance of PPBs wastes.

Another significant barrier identified by the participants was the lack of dustbins, which constituted (74.5%, n=298) of the responses. Many end users highlighted the challenge of not having easily accessible dustbins or recycling containers in their homes. This hindrance often leads to the disposal of PPBs in regular waste bins with other waste or throwing them anywhere, contributing to the overall problem of plastic waste management. The high percentage of the participants mentioning this barrier emphasizes the need for adequate infrastructure and facilities everywhere even near the road to facilitate proper participation in the reverse logistics performance of PPBs wastes.

Additionally, the absence of drop-off centres emerged as another notable barrier, accounting for 65.5% (n=262) of all responses. End-users 'expressed frustration with the limited availability of designated drop-off points for recycling PPBs wastes. This lack of a convenient location made it difficult for end users to collect and return the PPBs wastes responsively, leading to a decrease in their participation in reverse logistics practices. therefore, a high percentage of the participants highlighting this barrier emphasized establishing accessible and widespread drop-off centres to encourage active engagement in the reverse logistics performance of PPBs wastes (figure 3).

The above findings are further supported by an interview with an environmental officer at Ushirika ward who stated:

"We have some difficulties such as lack of drop off centres as it makes is difficult for people to participate. The lack of awareness is also a major issue as many end users are simply not aware of importance of recycling plastics. Additionally, the lack of motivation is a significant barrier, as many people do not feel that

they Rare adequately rewarded for their efforts in reverse logistics practices."
(Ushirika, 20 June, 2023)

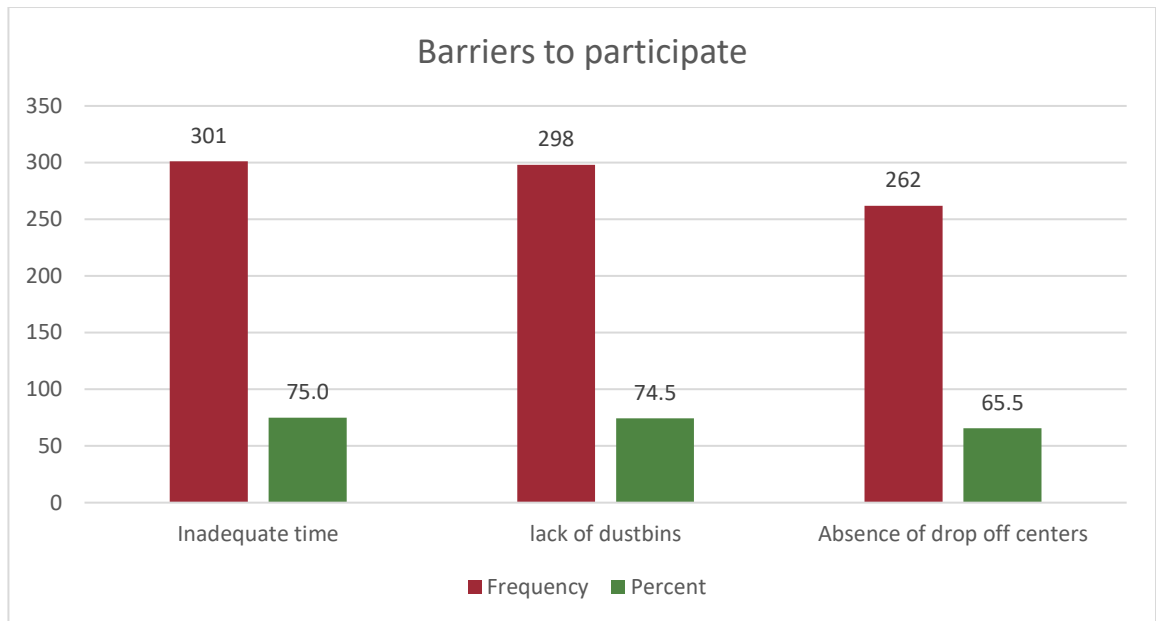


Figure 3 : Barrier that prevent end users to participate in reverse logistics performance of PPBs wastes

4.4 Role of Financial Incentives on End-Users' Participation in the Reverse Logistics of Plastic Packaged Beverages Wastes.

The second objective of this study was analysed using descriptive and inferential analysis. The data collected from the survey were analysed using IBM Corporation's Statistical Package for Social Science (SPSS) software, version 25. To analyse the data, both descriptive statistics (such as frequency tables, percentages, mean and standard deviation) and inferential statistics (including Spearman's rank-order correlation and t-test) were employed. The frequency table presents the occurrence of events or characteristics in this study, providing a clear count of each instance. Percentages provide a comparative analysis, allowing for explicit differentiation. The standard deviation measures the extent of variability within the data, indicating how much the values deviated from the mean. Whereas the mean, as a measure of central tendency, provided insight into the average value. Additionally, the choice of Spearman's rank-order correlation in this study was based on its suitability for determining the strength and direction between two variables at the ordinal level. The t-test, on the other hand,

was employed to assess whether there was a significant difference in the mean between the two groups.

By employing both descriptive and inferential statistics, this study utilized a comprehensive approach to analyse the data collected from the survey. The descriptive statistics provided valuable insights into the frequency, percentages, mean and standard deviation, while the inferential statistics, namely Spearman's rank-order correlation and t-test, enabled the examination of relationships and significant differences between variables.

4.4 Descriptive Statistics and Inferential Analysis

4.4.1. Perceived Roles of Financial Incentives for Participation in Reverse Logistics of PPBs Wastes.

The results in Table 11 indicate the perceived roles of financial incentives for the sampled population to participate in the reverse logistics of plastic packaged beverages (PPBs) wastes on a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5).

More than half (66.5%) of the participants strongly agreed that providing financial incentives is the main consideration for increasing people's participation in the collection and sorting of PPBs waste. Additionally, 61.3% of the participants strongly agreed that financial incentives would act as a motivational factor for returning PPBs waste. Furthermore, 59% of the participants strongly agreed that financial incentives would increase the desire to return PPBs waste, while 57% strongly agreed that financial incentives would promote awareness of returning PPBs waste. Lastly, 53.3% of the participants strongly agreed that financial incentives would be a sustainable way to return PPBs waste. Only 5.5% of the participants strongly disagreed that financial incentives would be a sustainable way to return PPBs waste, while 5% strongly disagreed that financial incentives would promote awareness of returning PPBs waste. In addition, 3.5% strongly disagreed that financial incentives would increase the desire to return PPBs waste, 2.3% strongly disagreed that financial incentives would increase people's participation in the collection and return of PPBs waste, and 2% strongly disagreed that financial incentives would act as a motivational factor for returning PPBs waste.

The findings from Table 11 regarding the roles of financial incentives in influencing end users' participation in the reverse logistics performance of PPBs show that increasing people's participation in the collection and sorting of PPBs is the major outcome (mean rank = 4.54). This means that financial incentives are crucial for people's participation in the reverse logistics performance of PPBs wastes in Moshi Municipality. Similarly, the minor role is that financial incentives would be a sustainable way to return PPBs waste (M = 4.14). This means that respondents are not sure if financial incentives will completely become a sustainable motivation strategy for people's participation in the reverse logistics performance of PPBs waste. The motivational factor for returning PPBs waste (mean rank = 4.40), followed by the increased desire to return PPBs waste (mean rank = 4.35), and lastly, the promotion of awareness of returning PPBs waste (mean rank = 4.25), are also highly perceived by end users as motivators to engage in the reverse logistics performance of PPBs waste. These results echo what prior researchers such as Abila and Kantola (2019) and Maki *et al.*, (2016) revealed. From the findings, a big inference can be drawn that financial incentives are an indispensable factor in increasing end users' participation in reverse logistics practices of PPBs wastes.

This finding is supported by an interview of an environmental officer at Bonite ward who said that:

“Offering incentives holds a promising prospect for motivating individuals to actively engage in sustainable reverse logistics practices. He said that financial incentives could serve as a tangible reward for environmentally conscious behaviours, creating a direct link between responsible actions and personal gain. Additionally, such incentives could not only drive immediate behavioural changes but also contribute to the long-term cultivation of eco-friendly habits.”
(Bonite, 22 June, 2023)

Table 11 : Role of Financial Incentives in Reverse Logistics Performance of PPBs wastes.

Roles	Strongly				Strongly agree	Mean Rank	Std. Deviation
	disagree	Disagree	Neutral	Agree			
1	9(2.3)	3(0.8)	17(4.3)	105(26.3)	266(66.5)	4.54	0.80
2	14(3.5)	8(2.0)	36(9.0)	106(26.5)	236(59)	4.35	0.97
3	20(5.0)	12(3.0)	44(11.0)	96(24.0)	228(57)	4.25	1.09
4	8(2.0)	19(4.8)	20(5.0)	108(27)	245(61.3)	4.40	0.93
5	22(5.5)	21(5.3)	48(12.0)	96(24.0)	213(53.3)	4.14	1.15

Percentages are in parentheses.

Table 12 : Variables and definitions for the role of financial incentives on reverse logistics performance of PPBs wastes.

Variables	Role of financial incentives on end users' participation
1	Financial incentives would increase participation in the collection and sorting of PPBs wastes
2	Financial incentive would increase the desire to return PPBS wastes
3	Financial incentives would promote awareness of returning PPBs wastes
4	Financial incentives would act as a motivational factor for returning PPBs wastes
5	Financial incentives would be a sustainable way to return PPBs wastes

4.4.1.1 Relationship Between FIRLP and Social Economic Factors of Households

A Spearman's rank-order correlation (Table 13) was used to investigate the direction and strength of the relationship between end users' perceived role of Financial Incentives for the Reverse Logistics Performance (FIRLP) of plastic packaged beverages wastes and social economic factors. The findings revealed a strong, positive correlation between the role of financial incentives and age, which was statistically significant with a correlation coefficient of 0.188 and a p-value of 0.000. This implies that perceived role of financial incentives for end users' participation in sorting and returning PPBs wastes increase with their age. Similarly, as people are very young, they are not much interested in that practices of collecting and returning PPBs wastes due to various reasons.

Furthermore, a Spearman's rank-order correlation (Table 13) was again used to determine the relationship between end users' perceived role of financial incentives for the reverse logistics performance of PPBs wastes and education level. The correlation coefficient of -0.062 indicates a very weak and negative relationship between the end users' perceived role of financial incentives for the reverse logistics performance of PPBs wastes and education level. The p-value of 0.214 indicates that there is no significant relationship between the perceived role of financial incentives for end users' participation in sorting and returning PPBs wastes and education level since the p-value is greater than 0.05. This suggests that the perceived role of financial incentives for the reverse logistics performance of PPBs wastes are not influenced by the education level of the end users.

The correlation between "financial incentives" and "marital status of respondent" is -0.042, which is also not statistically significant ($p = 0.403$). Hence, there is no significant association between financial incentives and the marital status of the respondents concerning reverse logistics performance of PPBs wastes. Further, the correlation between "financial incentives" and "employment status of respondents" is 0.310 with p -value = 0.012). This indicates a positive relationship between financial incentives and employment status in relation to reverse logistics performance of PPBs and the relationship is statistically significant at 0.05 alpha level. The correlation between "financial incentives" and "gender of the respondent" is 0.044, which is not statistically significant ($p = 0.384$). This means that there is no significant correlation between financial incentives and the sex of the respondents with respect to reverse logistics performance of PPBs wastes.

The findings suggest that there is a significant relationship between the perceived roles of financial incentives and age as well as employment status, while no significant relationship was found between these perceived roles and education level, marital status as well as gender. These results indicate that age and employment level may play a slightly more influential role in shaping perceptions of financial incentives compared to education, gender and marital status. Similar to the study by Correia *et al.* (2021) which explored consumers' motivation to participate in reverse logistics practices and revealed a significant relationship between age and monetary incentives. This study also revealed similar outcomes. These consistent findings across studies support the strength of the results and suggest the generalizability of the researcher's conclusions.

Table 13: Spearman correlation between financial incentives and social economic factors.

		FI	Gender	Age	Education	Marital status	Employment status
Spearman an's rho	Correlation	1.000	0.044	.188**	-0.062	-0.042	0.310
	FI coefficient						
	P-Value		0.384	0.000	0.214	0.403	0.012
	N	400	400	400	400	400	400

FI = financial incentive, **FIRLP**=financial incentives on reverse logistics performance.

4.4.1.2 Independent T- Test between Income-Earning and Non-Income-Earning End Users.

In this study, the researcher conducted an independent sample t-test to compare the means of the perceived role of financial incentives for end users' participation in sorting and returning PPBs wastes. The study focused on two distinct groups: income-earning end users and non-income-earning end users. The study's aim was to determine if there is statistical evidence to support the claim that the population means of these two groups are significantly different. The income-earning end users category comprised government employees, self-employed individuals, and private employees. On the other hand, the non-income-earning group included individuals who are currently unemployed. By analysing and comparing the perceived role of financial incentives between income-earning and non-income-earning groups, a researcher can gain insights into the impact of income on end users' willingness to participate in the reverse logistics performance of PPBs wastes.

The findings in Table 14 below showed that the non-income-earning end users' group (N = 116) is associated with its mean for the perceived role of financial incentives for reverse logistics performance of PPBs M = 4.28 (SD = 0.995). By comparison, the income-earning end users' group (N = 283) is associated with its numerically higher mean for the perceived role of financial incentives for reverse logistics performance of PPBs wastes M = 4.36 (SD = 0.77). Furthermore, the assumption of the uniformity of variance was tested and satisfied via Levene's F test (Table 14), F (398) = 3.77, P-value = 0.053, at a level of significance of 0.05 (where $p > 0.05$). The independent sample t-test is associated with no statistically significant effect, t (398) = -0.828, P-value = 0.40,

at a level of significance of 0.05 (where $p > 0.05$). Hence, there is no significant difference in the means of the perceived role of financial incentives for reverse logistics performance of PPBs wastes between income-earning and non-income-earning groups. This implies that both groups of end users show an interest in financial incentives. This is in line with previous research which found that both non-income-earning consumers and income-earning consumers are very sensitive to economic incentives (Crociata *et al.*, 2015 Abila and Kantola, 2019). The above findings are further supported by Random Utility Theory (RUT) which assumes that people generally choose what they prefer and where they do based on the highest utility obtained. This means that by estimating the utility associated with different economic factors and potential incentives such as monetary rewards, we can quantify individuals' preferences and predict their choices toward participation in the reverse logistics performance of PPBs wastes.

Table 14 : Independent T- Test between Income-Earning and Non-Income-Earning End Users

		Independent Samples Test							95% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
GMFI	EVA	3.7	0.05	-0.82	398	0.4	-0.07	0.09	-0.25	0.10
	EVNA			-0.74	173.9	0.45	-0.07	0.1	-0.28	0.12
Group Statistics for income and non-income earning of end users										
				Std. Deviation	Std. Error Mean					
INCOME		N	Mean							
GMFI	non-income earners	116	4.28	0.99	0.09					
	income earners	284	4.36	0.77	0.04					

Note: GMFI-group mean of financial incentives, EVA-Equal variance assumed, EVNA-Equal variance non assumed.

4.4.2.3 Cronbach Alpha

Cronbach alpha is a reliability test which measures the internal consistency of a scale. In particular, it measures the variance of measure for the variance of response in one item with the overall variance (Maughan and E.D, 2009). Cronbach alpha ranges between 0 to +1 and the higher the value closer to +1, the more reliable are the data and vice versa. Therefore, the Cronbach alpha for the perceived role of financial incentives for reverse logistics performance in this study was 0.897. This indicates that there is accuracy of the measures and the data is reliable (table 15).

Table 15 : The Reliability Test for the Perceived Role of Financial Incentives

		N	%	Cronbach's Alpha	N of Items
Cases	Valid	400	100.0	0.897	5
	Excluded	0.0	0.0		
	Total	400	100.0		

4.4.2.4 Other incentives apart from money that would encourage end users to participate in reverse logistics performance of PPBs wastes.

Open-ended questions were utilized to explore the range of incentives, other than monetary rewards that could motivate end users to actively participate in the reverse logistics performance of PPBs such as collecting and returning them for better disposal by using thematic analysis, the responses provided by the participants were analysed and the frequencies and percentages of the different incentives were calculated. Among the various incentives suggested by the participants, the provision of the dustbins emerged as the most frequently mentioned motivator. 60.8% (n=243) of the respondents highlighted the importance of having easily accessible and conveniently located dustbins to engage them in reverse logistics activities. This finding suggests that the provision of appropriate disposal infrastructure plays a crucial role in motivating end users to actively participate in the reverse logistics performance of PPBs wastes.

Another significant incentive identified by the participants was the provision of discounts. 58% (n=232) of the respondents emphasized that offering discounts on waste collection fees would enhance their motivation to contribute. This indicates that financial incentives in the form of discounts rather than direct money monetary rewards can be influential in engaging end users in sustainable reverse logistics performance of

PPBs wastes. Remarkably, the provision of certificates was also mentioned by a considerable proportion of the respondents, with 64% (n=256) expressing their preference for receiving recognition through certificates or achievement awards. This finding suggests that acknowledging and appreciating the efforts of the end users in reverse logistics practices can serve as a compelling non-monetary incentive, fostering a sense of accomplishment and encouraging continued participation.

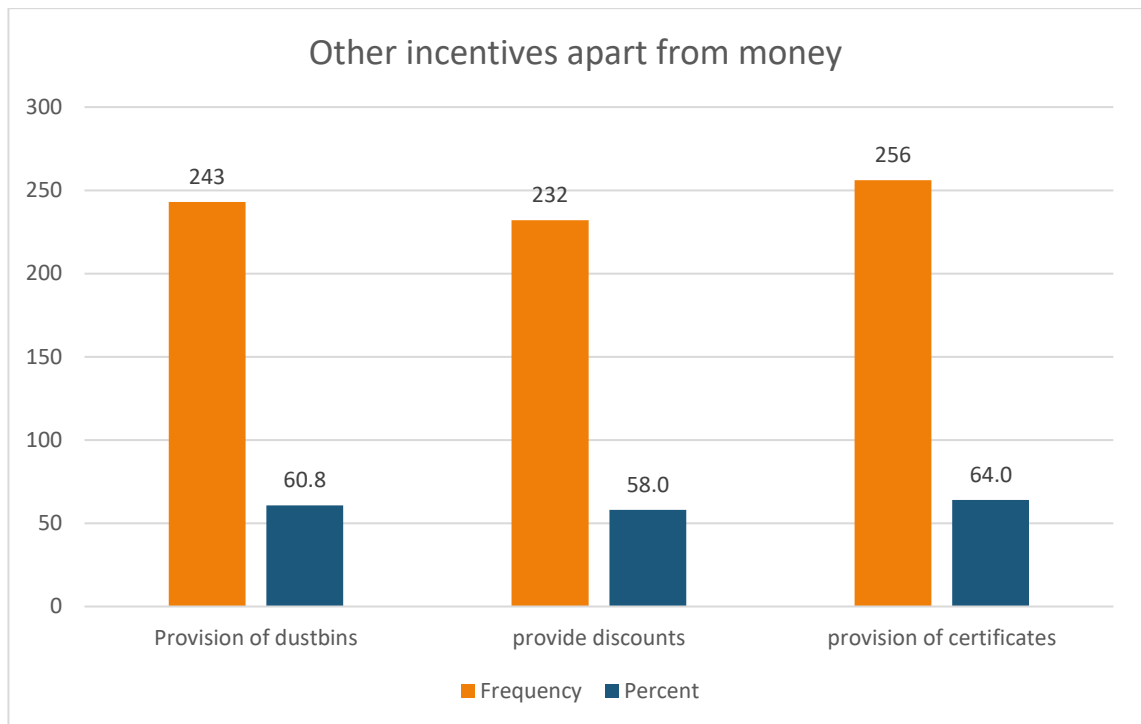


Figure 4 : non-monetary incentives that would encourage end users to participate in reverse logistics performance of PPBs wastes.

4.5 End users' Awareness on Reverse Logistics Performance of Plastic Packaged Beverages.

The study used descriptive statistics to assess end users' level of awareness of the reverse logistics performance of plastic packaged beverages. This objective focused on end users' knowledge about PPBs wastes, willingness to participate and awareness about the dangers of improper disposal of plastic packaged beverages wastes.

4.5.1 End Users' Knowledge of Plastic Packaged Beverages Waste.

Descriptive analysis of the data in Table 16 found that 92.3% of the respondents were familiar with plastic packaged beverage waste and 80% of the respondents usually buy them. On the other hand, the analysis on whether end users have knowledge about how PPBs wastes can be recycled or reused showed that a high percentage of them are aware

of recyclability and reusability at 80.8%,85.8% respectively while 59.3% of the respondents indicated that they do not sort out PPBs wastes from other types of waste at their homes. Additionally, the frequency of the responses to questions was relatively high with an average response rate of 85%. This indicates awareness and familiarity with plastic packaged beverages waste and the remaining is the target campaigns on how to sort out and return them for proper disposal.

The mean and standard deviation of the responses further shed light on the disruptive nature of the findings regarding end users' knowledge of the reverse logistics performance of PPBs. The average mean score of the respondents' knowledge level was 2.7 on the ordinal scale of measurement, ranging from no (1) to yes (3), indicating a relatively high average understanding of the concept. The average standard deviation of 0.7 suggests very low variation in the responses to the extent that almost all respondents have knowledge about PPBs wastes. Consequently, this variation overscores the homogeneous nature of the end user population in terms of their awareness and familiarity with PPBs waste.

Contrary to the findings of a study by Ding *et al.* (2022) which found that people lack knowledge about which plastics to be recycled and reused, this study revealed that most people are knowledgeable about the reusability and recyclability of plastic packaged beverages wastes. This discrepancy may be attributed to differences in methodology, sample size, or geographical context. Furthermore, this study only focused on PPBs wastes, while a Study by Ding *et al.* (2022) examined environmental awareness of reverse logistics practices concerning all plastic waste. These variations could explain the contrasting results.

Table 16 : The End users' Knowledge about Plastic Packaged Beverages Wastes

Respondents were asked whether they:	responses	Frequency	percentage	Mean	St. Deviation
Are familiar with ppbs wastes	No	20	5	2.87	0.46
	not sure	11	2.8		
	Yes	369	92.3		
Usually buy ppbs wastes	No	77	19.3	2.61	0.791
	not sure	3	0.8		
	Yes	320	80		
Are aware that ppbs wastes can be recycled	No	50	12.5	2.68	0.684
	not sure	27	6.8		
	Yes	323	80.8		
Are aware that ppbs wastes can be reused	No	42	10.5	2.75	0.63
	not sure	15	3.8		
	Yes	343	85.8		
Sort ppbs from other wastes at their home	No	237	59.3	1.78	0.96
	not sure	13	3.3		
	Yes	150	37.5		

4.5.2 End users' Willingness to Participate in Collection and Sorting of Plastic Packaged Beverages Waste.

From table 17, the descriptive findings revealed that most respondents are willing to participate once provided required material to make it easy for them. The frequency analysis indicated that the majority of the participants (77%, n=308) reported willingness to participate once provided dustbins and made easier for them. Additionally, (77.3%, n=309) of the respondents indicated the willingness to encourage their family and friends to participate in sorting and returning plastic packaged beverages wastes while a moderate proportion (49.3%, n=197) showed no willingness to pay fees to participate in reverse logistics performance of PPBs.

The average mean score for willingness to participate once provided with required materials and encouraging their family and friends was 2.58 on the ordinal scale of measurement, ranging from no (1) to yes (3). (SD=0.79), suggesting an overall willingness to participate in reverse logistics performance of plastic packaged beverages waste. Additionally, the standard deviation of 0.79 indicated a relatively low variability in the data, implying that many participants' responses were clustered closely around the mean. Therefore, these findings (table 17) suggest a high level of end users' willingness to participate in sorting and returning plastic packaged beverages waste.

These findings partially align with a study by Mwanza *et al.* (2018) as the researcher observed a high level of end users' willingness to participate in sorting and returning plastic packaged beverages wastes. Study Mwanza *et al.* (2018) also explored household involvement in reverse logistics of plastic solid waste in Zambia and found that despite the respondents' knowledge, half of them is willing to participate in the program. However, there were small differences in the level of willingness, which could be attributed to variations in data collection methods and sample characteristics.

Table 17 : End users' willingness to participate in collection and sorting of PPBs Wastes.

Respondents were asked whether they:	Responses	Frequency	Percentage	Mean	St. Deviation
would be able to separate PPBs wastes once provided dustbins	No	77	19.3	2.58	0.79
	Not sure	15	3.8		
	Yes	308	77		
would be likely to participate once they made easy for them	No	77	19.3	2.58	0.79
	Not sure	14	3.5		
	Yes	309	77.3		
would willingly encourage their family and friends to participate	No	63	15.8	2.61	0.74
	Not sure	28	7		
	Yes	309	77.3		
would willingly pay an additional fee to participate if applicable	No	197	49.3	1.91	0.91
	Not sure	43	10.8		
	Yes	160	40		

4.5.3 End users' Understanding about Dangers for Improper Disposal of PPBs wastes.

The descriptive findings revealed interesting insights regarding participants' awareness of the dangers associated with improper disposal of Plastic Packaged Beverages Waste (see Table 18). The findings showed that (78.5%, n=314) of the respondents were aware of and considered PPBs wastes as an environmental issue, (84.3%, n=337) of the respondents were aware of environmental pollution caused by improper disposal of PPBs and (59.5%, n=238) of them were aware of some initiatives to fight against improper disposal of plastic waste.

Furthermore, the frequency analysis indicated that (64.8%, n=259) of the respondents were aware of health problems associated with improper disposal of plastic waste. In

terms of means and standard deviation, the respondents' overall awareness of improper disposal of PPBs was assessed where the average mean score was 2.5 on the ordinal scale of measurement, ranging from no (1) to yes (3), indicating a high level of awareness about improper disposal of PPBs wastes among end users. The standard deviation between 0.6 to 0.9 suggested that end users' awareness about improper disposal was relatively consistent with only minor variations among the respondents.

The results highlight the need for targeted initiatives to enhance end users' understanding of the dangers associated with improper disposal of PPBs which will push them to participate in sorting and returning Plastic Packaged Beverages Wastes (reverse logistics performance) as even those with moderate understanding could benefit from additional and education campaign.

By comparing our findings with the empirical literature, the research has identified areas of agreement and divergence. The alignment with studies by Mwanza *et al.* (2018) and Linh *et al.* (2019) strengthens the validity of this study's results, while the discrepancies observed with studies (Ding *et al.*, 2022 and Fikru, 2020), highlighted the need for further investigation and consideration of contextual factors. The above findings are further supported by Random Utility Theory (RUT) which is built on the assumption that an individual maximizes his utility from discrete choices on a given set of alternatives. By estimating the utility associated with different factors, such as environmental impact, danger and health problems associated with improper disposal we can then quantify individuals' preferences and predict their choices towards active participation in collecting and returning PPBs wastes for proper disposal.

Table 18 : End users' understanding of dangers of improper disposal of PPBs Wastes.

Respondents were asked whether they:	Responses	Frequency	Percentage	Mean	St. Deviation
Consider PPBs wastes an environmental issue	No	59	14.8	2.64	0.8
	Not sure	27	6.8		
	Yes	314	78.5		
Are aware of environmental pollution caused by with improper disposal of PPBs	No	49	12.3	2.72	0.7
	Not sure	14	3.5		
	Yes	337	84.3		
Believe that environmental pollution from plastic wastes has negative effect on them and the community	No	77	19.3	2.58	0.8
	Not sure	16	4		
	Yes	307	76.8		
Have ever heard of any initiatives to fight against improper disposal of plastic wastes	No	150	37.5	2.22	0.96
	Not sure	12	3		
	Yes	238	59.5		
Are aware of health problems associated by improper disposal PPBs wastes	No	108	27	2.38	0.9
	Not sure	33	8.3		
	Yes	259	64.8		

4.5.4 Benefits of Participating in Proper Disposal of PPBs Wastes as Reverse Logistics Practices.

Figure 5 below revealed that a significant portion of the participants emphasized the benefits of proper disposal of PPBs wastes in terms of a clean environment. (78.5%, n=314) of the respondents mentioned that one of the primary advantages of implementing effective reverse logistics practices of PPBs is the positive impact it has on maintaining a clean and sustainable environment. These findings indicate that a majority of the participants recognized the importance of responsible PPBs waste

management in preserving the ecological balance and improving overall environmental conditions.

Open-ended question responses again indicated employment creation as another benefit of proper disposal of PPBs wastes. (70%, n=280) of the participants acknowledged this aspect. The respondents highlighted that the implementation of effective reverse logistics practices for PPBs wastes creates employment opportunities in various stages of the waste management process. They mentioned job roles related to collection, sorting, recycling and manufacturing recycled products. These findings suggest that a considerable percentage of the participants recognized the potential economic benefits associated with proper plastic packaged beverages waste disposal, such as job creation.

In terms of the prevention of diseases, the analysis of open-ended question responses indicated that 74.5% (n=298) of the participants identified this as a benefit of proper PPBs disposal.

This finding is supported by an interview of an environmental officer at Sabasaba ward who said that:

“Engaging in proper disposal methods, Sabasaba not only contributes to the reduction of environmental pollution but also fosters a sense of responsibility within the community. Furthermore, the officer highlighted the economic gains achievable through recycling initiatives, including the creation of employment opportunities and the potential to generate revenue through the sale of recycled materials.” (Sabasaba, 22 June, 2023)

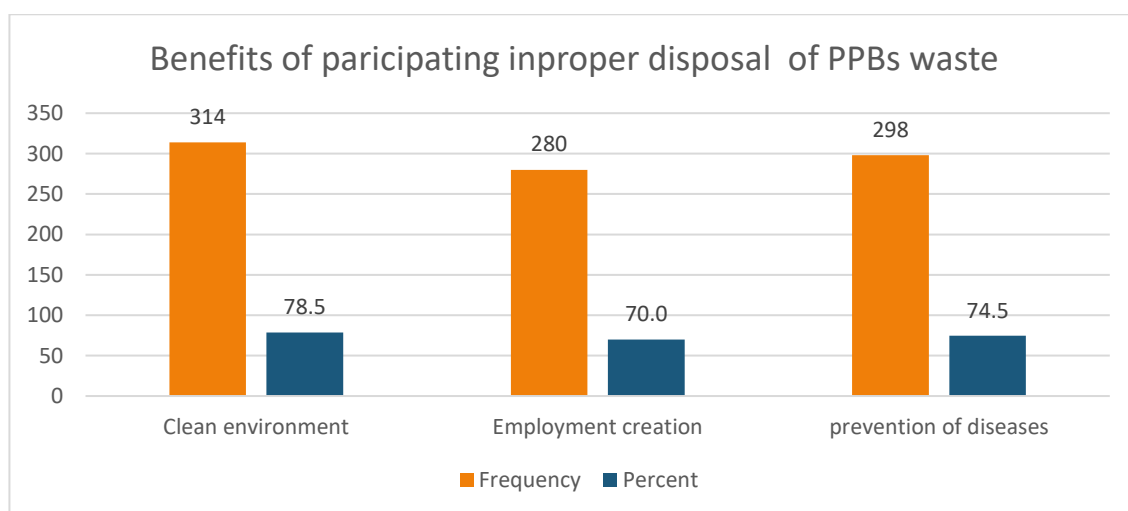


Figure 5 : Benefits of participating in proper disposal of PPBs wastes.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter provides a summary of the study, conclusion, and recommendations to the findings based on the areas in which the researcher aimed the work to be reached to solve the intended problems and suggestions for further studies on research regarding end users' participation in reverse logistics performance of plastic packaged beverages waste in Moshi Municipality.

5.1 Summary of the Findings

This study examined end users' participation in reverse logistics performance of plastic packaged beverages wastes in Moshi Municipality, Tanzania. It was guided by three specific objectives namely: determining factors that influence end users' behavioural intention to participate in reverse logistics performance of plastic packaged beverages wastes (PPBs), investigating the roles of financial incentives on end users' participation in reverse logistics performance of PPBs, and assessing end users' awareness on reverse logistics performance of PPBs wastes. For the purpose of this study, a cross-sectional research design was used. Therefore, the researcher used survey questionnaires, interviews, and reviews of relevant literature to gather both primary and secondary data. The collected data were then analysed using SPSS and SmartPLS4 software.

Through comprehensive data analysis, the findings for the first objective revealed that both Attitude and Perceived Behavioural Control had a significant direct effect on the Reverse Logistics Performance of PPBs wastes. However, Subjective Norms, on the other hand, appeared to have a less significant impact on end users' participation. Additionally, the analysis of open-ended questions revealed several key barriers to end users' participation in the reverse logistics performance of PPBs wastes, such as the lack of time to participate in various reverse logistics practices, lack of needed materials such as dustbins, and absence of community-based drop-off centres.

Regarding the second objective, the findings signalled that financial incentives were considered crucial for increasing people's participation in the collection, sorting, and returning of PPBs wastes. Participants strongly agreed that financial incentives acted as the main consideration, motivational factor, and sustainable way to encourage participation. The study used Spearman's rank-order correlation and t-test to analyse the

relationships between variables. The results showed a strong positive correlation between the perceived roles of financial incentives with age and employment status, whereby both factors were found to have a relatively high influential role in shaping perceptions of financial incentives compared to education level, gender, and marital status. Furthermore, t-tests were conducted to compare the perceived roles of financial incentives to participate in reverse logistics performance of PPBs wastes between income-earning (government, self-employed, private employed) and non-income-earning groups (unemployed). The results indicated a significantly same perception among the members of both groups as they all claimed the provision of financial incentives to be a pivotal factor for participation. Additionally, responses from open-ended questions suggested that non-monetary incentives, such as the provision of dustbins, discounts, and certificates, can also effectively encourage participation in reverse logistics practices.

Finally, the findings from the third objective showed that a high percentage of respondents were familiar with PPBs and bought them. However, most of them agreed that they do not sort out PPBs waste while dumping wastes and have never disposed of them for recycling or reuse. Surprisingly, the study also found that most respondents were willing to participate in the collection and sorting of PPBs wastes, especially if provided with the necessary materials. Respondents demonstrated awareness of the environmental and health dangers associated with improper disposal of PPBs waste, and the majority recognized the benefits of proper disposal, such as maintaining a clean environment, creating employment opportunities, and preventing diseases. These findings shed light on end users' participation in the reverse logistics performance of PPBs wastes and provide valuable insights into logistics performance.

5.2 Conclusion

Firstly, the study highlighted the significant impact of attitudes and perceived behavioural control on the participation of end users in the reverse logistics performance of PPBs wastes. While Subjective Norms appeared to have a comparatively lesser impact, suggesting that external influences might be less influential in driving end users' participation. It became evident that fostering positive attitudes and enhancing individuals' sense of control over their participation could substantially boost their involvement in the reverse logistics performance of PPBs wastes. The study also identified key barriers to participation, including lack of time, inadequate dustbins, and

absence of drop-off centres, emphasizing the need for addressing these obstacles such as providing adequate infrastructure and facilities everywhere even near the road, considering time constraints and establishing accessible and widespread drop-off centres to facilitate proper participation in reverse logistics performance of PPBs wastes.

Secondly, the study concludes the vital role of financial incentives in motivating end users to actively participate in various reverse logistics practices, including the collection, sorting, and returning of PPBs wastes. The strong agreement among participants regarding the importance of financial incentives indicates that these incentives are not only perceived as motivators but also as sustainable strategies for promoting participation. The study reveals interesting insights into the relationship between demographic factors (such as age, employment status and income) and the perceived roles of financial incentives. Age and employment status emerged as influential factors in shaping individuals' perceptions of financial incentives, indicating that tailoring incentive strategies based on these demographics could yield more effective outcomes. Moreover, the relatively consistent perception of financial incentives across income-earning and non-income-earning groups suggests a shared understanding of their significance. Additionally, while financial incentives hold considerable importance, the research acknowledges the potential effectiveness of non-monetary incentives such as dustbins, discounts and certificates in encouraging participation.

Moreover, the findings indicate a notable level of awareness among respondents regarding the environmental and health implications of improper PPBs waste disposal. This awareness, coupled with the willingness expressed by most respondents to engage in waste collection and sorting, highlights the potential for fostering positive behavioural change. The willingness to participate, especially when provided with necessary materials, suggests that removing practical barriers can have a significant impact on actual involvement. Respondents' recognition of the benefits associated with proper PPBs waste disposal, such as maintaining a clean environment, creating employment opportunities, and preventing diseases, emphasizes the broader positive impact that effective reverse logistics practices can have on both the local community and the environment.

Overall, this research contributes to understanding the dynamics of end users' participation in the reverse logistics performance of PPBs wastes in Moshi Municipality. The findings concluded that interventions should focus on shaping positive attitudes, providing financial and non-monetary incentives, addressing practical barriers, and enhancing awareness and willingness to participate. By addressing these factors, it is possible to promote greater end user engagement in reverse logistics practices, contribute to more sustainable waste management in the region and contribute to the overall well-being of the community and environment.

5.3 Recommendations

From the research findings, the recommendation was made based on the findings to different responsible stakeholders. As stakeholders seek to enhance the efficacy of reverse logistics practices and alleviate the environmental impact of plastic waste, the insights garnered from this research can inform the design and implementation of initiatives that echo the values and motivations of end users. These recommendations aim to foster a culture of responsible waste management and promote end users' participation in the reverse logistics performance of plastic packaged beverage waste in Moshi Municipality. By addressing attitudes, providing incentives, overcoming barriers and improving knowledge, stakeholders can work together to achieve more sustainable waste management outcomes.

5.3.1. To the Government and Policy Makers

The study recommends that the government should develop and enforce regulations. The establishment of regulations and policies that require proper reverse logistics practices for plastic packaged beverage waste. This can include mandatory recycling programs, waste management guidelines, and penalties for improper disposal. Further, it should invest in infrastructure, this means, Increasing the availability of dustbins by ensuring that an adequate number of dustbins are placed in public areas, residential neighbourhoods, and commercial spaces. This will make it easier for end users to dispose of plastic packaged beverages waste appropriately. Also, establish drop-off centres, and set up conveniently located drop-off centres where end users can return their plastic packaged beverages waste for recycling or proper disposal. These centres should be easily accessible and provide clear instructions on how to participate. Lastly, provide financial incentives to end users who actively participate in reverse logistics practices. This can serve as a motivating factor to increase participation. Non-monetary

incentives also should be considered such as offering discounts or rewards, to end users who engage in reverse logistics activities. This can complement financial incentives and cater to individuals who may not be solely motivated by monetary rewards.

5.3.2. To the Companies

Companies should Collaborate with stakeholders by engaging in partnerships with government agencies, waste management organizations, and recycling companies to establish efficient and effective reverse logistics systems. This collaboration can facilitate the collection, sorting, and recycling of plastic packaged beverage wastes. Further, companies should offer financial incentives. This means providing financial incentives to end users for their participation in reverse logistics practices in the form of discounts, loyalty rewards, or other incentives that motivate consumers to return the waste. Additionally, Companies should educate end users to raise awareness among them about the environmental impact of plastic packaged beverage waste and the importance of proper disposal. This can be done through educational campaigns, labelling, and product packaging that encourages responsible behaviour.

5.3.3. To the End Users

End users should be educated about the importance of their participation in reverse logistics activities and the benefits of proper waste disposal. Awareness campaigns, public service announcements, and educational materials can help bridge the knowledge gap and encourage responsible behaviour. Also, utilize financial incentives offered by companies or the government for participating in reverse logistics practices. Additionally, consider non-monetary incentives, such as discounts, certificates, or rewards, which can further motivate participation. Collaborate with local authorities and organizations to advocate for the development of infrastructure that supports proper waste disposal and encourages participation in reverse logistics.

By implementing these above recommendations, it is expected that end users' participation in the reverse logistics performance of plastic packaged beverages waste in Moshi Municipality will increase. These recommendations focus on raising awareness, providing incentives, addressing practical barriers, and fostering positive attitudes, all of which can contribute to more sustainable waste management practices in Tanzania.

5.4. Areas for Further Studies

The study was carried out to investigate end users' participation in the reverse logistics performance of plastic packaged beverages waste in Moshi Municipality, Tanzania. The study focused on end users of PPBs. Therefore, it is advised to other scholars to conduct this study by investigating the role of stakeholders such as beverage and waste management companies in engagement and collaboration in enhancing reverse logistics performance for PPBs wastes. The study also focused on attitude, subjective norms and perceived behavioural control as factors influencing behavioural intentions. The researcher encouraged other scholars to carry out further studies on the influence of various socio-demographic factors, such as education level, occupation, and income, on end users' behavioural intention to participate in the reverse logistics performance of PPBs wastes. This would provide a deeper understanding of how these factors shape individuals' attitudes and motivations towards participation.

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APPENDICES

Appendix 1: Research Questionnaire

Dear respondent,

This research is conducted as a partial fulfillment of Master of Procurement and Supply Chain Management (MA-PSM) at Moshi Co-operative University. The research is entitled with “End users’ participation in reverse logistics performance for plastic packaged beverages waste in Moshi Municipality, Tanzania”. Aiming at, explaining the performance reverse of plastic packaged beverages with the influence of end users. I would be very grateful if you would take a few minutes to fill this short questionnaire genuinely and your participation in this survey shall be highly appreciated. Be assured that all answers you provide will be kept in the strict confidentiality and shall be used for academic purposes only. If you have a question(s) regarding this questionnaire, do not hesitate to contact me at +255778556199 or nahimanasoso22@gmail.com. Thank you.

Instructions

- Don’t write your name.
- Try to answer to all questions.

Section A: General Household Information

1. Sex: Male Female

2. Age :

18 -25 26-30 30-40 above 40

3. Please circle the highest educational level completed:

Primary Secondary certificate diploma

Bachelor masters PhD

4. are you currently (check only one)

Married Separated Widowed Single Divorced

5. How many members are there in your house?

Male..... Female.....

6. Employment status of the respondent

Unemployed Government Employee self-employed
 private employed

Section B: Factors Influencing End Users’ Behavioural Intention To Participate In Reverse Logistics Of Plastic Packaged Beverages.

7. Below are statements and questions regarding end users’ belief and perception towards behaviour (**attitude**) on participation in plastic packaged beverages wastes collection and sorting process. Please read each one, and mark (**X**) the box with the number that corresponds with your answer. Whereby **1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree**

Attitude	1	2	3	4	5
I would consider participating in plastic package beverages wastes collection and sorting process useful to me					
I will feel happy when I participate in collection and sorting plastic package beverages wastes.					
I believe that participation and sorting plastic package beverages wastes would be profitable					
I consider it as my responsibility to participate and sort out plastic package beverages wastes.					

8. Please read the statements provided in the table below indicating end users' beliefs about whether the community around him/her would approve or disapprove his/her participation in the collection and sorting of plastic packaged beverage wastes (**subjective norms**). You are requested to indicate your level of agreement or disagreement whereby **1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree**

Subjective norms	1	2	3	4	5
I believe that many members of my community would appreciate it if I participated in collecting and sorting of plastic packaged beverage wastes.					
I suppose that many members of my community would encourage me to participate in collecting and sorting of plastic packaged beverage wastes.					
I think that many members of my community would agree to participate in collecting and sorting of plastic packaged beverage wastes.					
I believe that my family members consider participation in collection and sorting of plastic package a good thing to do.					

9. Below are various statements regarding the individual's control over their behaviour (**perceived behavioural control**) towards the participation in collection and sorting of plastic packaged beverage waste. Please mark the box (**X**) with the number that corresponds with your answer, whereby **1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree**

Perceived behavioural control	1	2	3	4	5
I would like to know what items of plastic packaged beverage waste to be collected and sorted out of other wastes.					
Participation and sorting plastic packaged beverages waste is convenient to me.					
It will be easy for me to participate in collection and sorting of plastic packaged beverages waste					
I would have many advantages by participating in collection and sorting plastic packaged beverage waste.					

10. Are you willing to engage in sorting and returning plastic package beverages waste to the collection point for proper disposal?

1= No

2 = Yes

11. Have you ever participated ever participated in the process of sorting and returning plastic package beverage waste?

1= No

2 = Yes

12. What are some barriers or challenges that prevent you from participating in collection and sorting of plastic packaged beverages?

.....
.....

SECTION C: Role of Financial Incentives on End Users' Participation in The Reverse Logistics of Plastic Packaged Beverage Waste.

13. Are there incentives for peoples' participation in waste collection in your neighbourhood? Please select one answer.

- A. Yes, there are incentives for money.
- B. Yes, there incentives for punishment
- C. Neither money nor punishment
- D. I don't know

14. From the statements presented in the table below, you are requested to indicate your level of agreement or disagreement whereby 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree.

Roles of financial incentives	1	2	3	4	5
Financial incentives would increase peoples' participation in the collection and sorting of plastic packaged beverage wastes.					
Financial incentives would increase the desire to return plastic packaged beverages waste.					
Financial incentives would promote awareness of returning plastic packaged beverage wastes.					
Financial incentives would act as a motivational factor for returning plastic packaged beverage wastes.					
Financial incentives would be a sustainable way to return plastic packaged beverage waste.					

15. Are there any other incentives or rewards apart from money that would encourage you to participate in collection and sorting of plastic packaged beverages waste?

.....

Section D: End Users' Awareness on Reverse Logistics Performance of Plastic Packaged Beverages

16. This part of questionnaire covers **knowledge to participate** in reverse logistics performance of plastic packaged beverages waste. There are three options to answer here. 1 stands for “no”, 2 for “Not sure”, 3 for “yes”. Please indicate how much you know or otherwise with each of the following statements by putting check mark “√” on the box provided that best represents your opinion.

Knowledge	1	2	3
Are you familiar with plastic packaged beverages waste?			
Do you usually buy plastic packaged beverages?			
Are you aware that plastic packaged beverages wastes can be recycled?			
Are you aware that plastic packaged beverages wastes can be reused?			
Do you sort plastic packaged beverages from other waste at your home?			
Do you have a regular plastic packaged beverages collection point in your area?			
Do some people dump plastic packages waste alongside the garbage bin instead of putting it inside those?			

17. This part of questionnaire covers willingness to participate in reverse logistics performance of plastic packaged beverages waste. There are three options to answer here. 1 stands for “no”, 2 for “Not sure”, 3 for “yes”. Please indicate how much you know or otherwise with each of the following statements by putting check mark “√” on the box provided that best represents your opinion.

Willingness	1	2	3
Will you be able to separate plastic packaged beverage wastes from other types of waste?			
Do you usually willingly put plastic packaged beverage wastes in a separate garbage bin while disposing wastes?			
Will you be willing to sort out plastic packaged beverages waste at your home?			
Are you willing to encourage your family members in collection and sorting of plastic packaged beverages wastes?			
Are you willing to pay for plastic packaged beverages wastes collection fee?			

18. This part of questionnaire covers dangers of improper disposal of Plastic Packaged Beverages waste on performance of reverse logistics. There are three options to answer here. 1 stands for “no”, 2 for “Not sure”, 3 for “yes”. Please indicate how much you know or otherwise with each of the following statements by putting check mark “√” on the box provided that best represents your opinion.

Dangers for improper disposal PPBs	1	2	3
In your opinion is plastic packaged beverages waste an environmental issue?			
Are you aware of environmental pollution caused by improper disposal of plastic packages beverages waste?			
Do you believe that environmental pollution from plastic waste has negative effect on you and the community?			
Have you ever heard of any initiatives to fight against improper disposal of plastic wastes?			
Are you aware of health problems associated by improper disposal of plastic waste from beverage packaging?			

19. In your opinion, what are the benefits of proper disposal of plastic packaged beverage wastes such reusing, recycling?

.....

Thanks for your cooperation.

Appendix 2: Key informant Interview Checklist Guides

1. What are your thoughts on financial incentives as a way to encourage end-users to participate in reverse logistics of plastic packaged beverages wastes?
2. Are there any other factors that you think could motivate end-users to participate in the reverse logistics of plastic packaged beverages wastes, beyond financial incentives?
3. What suggestions do you have for improving the effectiveness of reverse logistics activities for plastic packaged beverages wastes?

Appendix 3: Matrix of Data Analysis

Objectives	Research Questions	Types Of Variables and Their Indicators	Methods For Data Analysis	Measurement Scale	Tools
determine factors influencing end users' behavioural intention to participate in reverse logistics of plastic packaged beverages waste.	What are the factors that influence end users' behavioural intention to participate in the reverse logistics of plastic packaged beverages?	Behavioural intention factors: Attitude, subjective norms, Perceived Behaviours Control.	PLS-SEM	Five-point Linkage scale	Questionnaires and interview guide
investigate the role of financial incentives on end users' participation in the reverse logistics of plastic packaged beverages.	How financial incentives affect end users' participation in the reverse logistics of plastic packaged beverages?	Roles of financial incentives: Returning PPBs level increased, Increased desire to return PPBs wastes, PPBs waste returning awareness promotion, A motivational factor for returning PPBs waste, A sustainable way to return PPBs	Descriptive statistics and inferential analysis	Five-point Linkage scale	Questionnaires and interview guide
assess the level of awareness among end users' on reverse logistics performance of plastic packaged beverages.	What is the level of awareness among end users on RL of plastic packaged beverages?	End users' awareness of plastic packaged wastes. Knowledge, Willingness, Dangers of improper disposal	Descriptive statistics	Ordinal scale	Questionnaires and interview guide

Appendix 4: Research Permit from Moshi Municipality



THE UNITED REPUBLIC OF TANZANIA
 PRESIDENT'S OFFICE REGIONAL
 ADMINISTRATION AND LOCAL
 GOVERNMENT (PO-RALG)
 MOSHI MUNICIPAL COUNCIL



In reply please quote:

Ref. No. MMC/ A.40/13/1/VOL.32/95

Date: 10th May, 2023

Head of Department,
 Moshi CO-Operative Univesity (MoCU)
 P.O.BOX 474


MOSHI

**RE: REQUEST FOR RESEARCH AND DATA COLLECTION FOR
 SOLANGE NAHIMANA**

Please refer to your letter dated on 05th May, 2023 regarding to the heading above.

2. With this letter, permission has been granted to the student named above to conduct the research and collect data about **"End Users Participation on reverse logistics Perfomance of Plastics Parkaged Beverage in Moshi Municipal Council**
 The permission has been granted from 13 May, 2023 to 30th May, 2024.

3. Best regards.

 **MOSHI MUNICIPAL DIRECTOR
 MOSHI**
 Leonia T. Mwamwala,
For: DIRECTOR

C.C : Head of Division - *Please assist*
 Procurement Management and ICT
MOSHI MUNICIPAL

: Solange Nahimana
 Student
 Moshi Co-Operative Univesity
Moshi.

Appendix 5: Research Permit from Kilimanjaro Regional Office

**THE UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT**

KILIMANJARO REGION
Telegrams 'REGCOM' KILIMANJARO
Tel. No. 027-2754236/7, 2752184
Fax No. 027 - 27-54430
E-mail ras.kilimanjaro.go.tz
Ras.kilimanjaro@tamisemi.go.tz



OFFICE OF THE REGIONAL COMMISSIONER,
17 ROAD FLORIDA
P. O. BOX 3070
25107 - MOSHI

In reply please quote:

Ref. No. DA.259/288/01/344

05 May, 2023

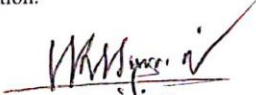
**MUNICIPAL DIRECTOR,
P.O. BOX 318,
MOSHI,**

Re: RESEARCH PERMIT

Refer to the above subject.

2. I would like to introduce to you **SOLANGE NAHIMANA** who is a Bonafide Research Student from **Moshi Cooperative University (MoCU)**.
3. She expects to conduct research on "**END USERS PARTICIPATION ON REVERSE LOGISTICS PERFORMANCE OF PLASTICS PACKAGED BEVERAGES IN MOSHI MUNICIPALITY TANZANIA.**"
4. The permission has been granted for her to collect data from **13th May, 2023 to 30th May, 2024.**
5. Please give her the required co-operation and make sure that she abides by all Government Rules and Regulations.

Thank you for your cooperation.


Sallemia, J.K

For: Regional Administrative Secretary.

Copy to: **SOLANGE NAHIMANA**
Research student

Appendix 6: Letter from Moshi Cooperative University



Unapojibu tafadhali taja:

Kumb. Na. MoCU/UGS/3/41

Tarehe: 28 Aprili, 2023

Katibu Tawala,
 Mkoa wa Kilimanjaro,
 S. L. P. 3070
MOSHI.

YAH: KIBALI CHA KUFANYA UTAFITI KWA WANAFUNZI WA CHUO KIKUU CHA USHIRIKA MOSHI (MoCU)

Tafadhali husika na kichwa cha habari hapo juu.

Madhumuni ya barua hii ni kumtambulisha kwako **Ndugu Solange Nahimana** mwanafunzi wa Chuo Kikuu cha Ushirika Moshi ambaye kwa sasa anatarajia kufanya utafiti katika eneo lako.

Maombi haya yamezingatia Waraka wa Serikali wenye Kumb. Na. MPEC/R/10/1 wa tarehe 7 Julai, 1980 pamoja na Hati Idhini ya Chuo Kikuu cha Ushirika Moshi (MoCU). Moja ya majukumu ya Chuo ni kufanya tafiti na kutumia matokeo ya tafiti hizo katika kufundishia. Aidha, wanafunzi hufanya tafiti kama sehemu ya masomo yao wakiwa Chuoni.

Ili kufanikisha utekelezaji wa tafiti hizo, Makamu Mkuu wa Chuo hutoa vibali vya kufanya tafiti nchini kwa wanataaluma na wanafunzi kwa niaba ya Serikali na Tume ya Sayansi na Teknolojia.

Hivyo basi, tunakuomba umpatie mwanafunzi aliyetajwa hapo juu msaada atakaouhitaji ili kufanikisha utafiti wake. Gharama za utafiti atalipia mwenyewe. Msaada anaouhitaji ni kuruhusiwa kuonana na viongozi na wananchi ili aweze kuzungumza nao kuhusiana na utafiti wake. Aidha, endapo kuna maeneo yanayozuiliwa kufanyika kwa shughuli hii, tafadhali mjulishe hivyo.

Mada ya utafiti wa mwanafunzi aliyetajwa hapo juu ni: **"End Users' Participation on Reverse Logistics Performance of Plastic Packaged Beverages in Moshi Municipality, Tanzania"**

General: Moshi Co-operative University, 06 Sokoine Road, 25121 Mfumuni, P. O. Box 474, Moshi, Tanzania,
 Tel: +255 272751833 Email: info@mocu.ac.tz, Website: www.mocu.ac.tz